

3rd Edition

Practical ENT



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PRACTICAL E.N.T.

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HISTORY TAKING IN E.N.T.

1. **NAME :** Name is asked -
 - For the identification of the patient.
 - For developing rapport with the patient.
 - For maintaining the record of the patient.
2. **AGE :** Certain diseases are common in certain age groups like -
 - Presbycusis is common in old age (*it is the condition in which bilateral high frequency sensorineural hearing loss occurs.*)
 - Atrophic rhinitis and otosclerosis are more common at puberty.
3. **SEX :** Certain diseases are common in particular sex like -
 - Juvenile nasopharyngeal angiofibroma (JNAF) is exclusively found in males.
 - Atrophic rhinitis and otosclerosis are more common in females.
(*Otosclerosis causes ankylosis of footplate of stapes and causes conductive deafness and tinnitus. It is treated medically by sodium fluoride and surgically by stapedectomy.*)
4. **CASTE :** Certain castes have certain type of diseases like -
 - Bodhya community (Mahar) of Vidarbha region of India has more incidence of sickle cell anaemia, hence epistaxis is more common.
 - Sindhis and Bhanushalis have more incidence of thalassemia major & have more episodes of epistaxis and bleeding disorder.
5. **RELIGION :** Because of consanguinious marriage in Muslims, the incidence of congenital sensorineural deafness is more.
6. **OCCUPATION :**
 - Vocal nodules are more common in hawkers and in children who scream a lot.

- Septal perforation is more common in nickel, chromium and arsenic workers.
- Sensorineural hearing loss (specially at 4000 Hz) is more common in people who are exposed to constant loud noise like mill workers, persons staying near railway tracks or airport.
- Laryngocele was believed to be more common in trumpet blowers and glass workers.

(Laryngocele is the enlargement of saccule. It may be of external, internal or mixed variety.)

7. **ADDRESS :** Certain diseases have more geographical predilection -

- Rhinosporidiosis is very common in Jharkhand, Chattisgarh, Madhya Pradesh and West Bengal states of India. The earlier belief of scleroma line which states that if a horizontal line is drawn from Mumbai to Vishakhapatnam, the area above has more incidence of rhinoscleroma and the area below has more incidence of rhinosporidiosis is not very accepted.

- *Rhinoscleroma is a progressive granulomatous disease caused by Klebsiella rhinoscleromatis. Histologically it has Mikulicz cell containing Frisch bacilli. The end result of this disease is painless stenosis of vestibule and nose. It is treated by the surgical excision of stenotic lesion.*
- *Rhinosporidiosis is a fungal infection caused by the Rhinosporidium seeberi and kinealyi. It is more common in those who take bath in pond where cattles also have bath. It spreads by the dust from the dung of infected cows and cattle. The treatment is surgical excision.*

- Plummer Vinson syndrome is very common in central part of Gujarat India.

Plummer Vinson syndrome consists of dysphagia, hypochromic microcytic anaemia, glossitis, angular stomatitis and koilonychia. The complication of this syndrome is postcricoid web formation.

8. **PAST HISTORY :** Enquire about previous history of -

- Diseases like diabetes, tuberculosis and hypertension. All these may have bearing on the present state of disease like in untreated or active tuberculosis there may be associated tuberculous otitis media or laryngeal tuberculosis. In untreated or uncontrolled diabetes, the chances of infection are very high.

- Drugs - Certain drugs are toxic to ear like streptomycin is vestibulotoxic while dihydro-streptomycin is cochleotoxic. Quinine or salicylates cause tinnitus in the ear.
- Postnatal jaundice may cause deafness due to the deposition of conjugated bilirubin in brain stem nuclei.
- Head injury- Fracture of cribriform plate may cause anosmia or C.S.F. rhinorrhoea. Fracture of temporal bone may cause deafness, facial nerve palsy or C.S.F. otorrhoea.

9. PERSONAL HISTORY :

- Smoking may lead to carcinoma larynx.
- Tobacco and 'Gutkha' chewing may cause carcinoma of oral cavity and oral submucous fibrosis (OSMF).
- Postcricoid carcinoma is more common in cigar smokers.
- Senile degenerative changes of inner ear are early in heavy smokers and heavy alcoholics.

10. FAMILY HISTORY : To know the hereditary cause of deafness like -

- Otosclerosis is an autosomal dominant disease.
- Congenital sensorineural deafness in children is directly related with Mendelian law.

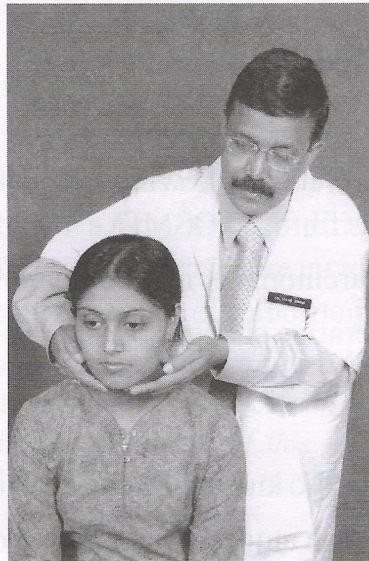
Mendelian law states that when two hybrid (people with normal hearing but carrying deafness) marry, then deaf children must follow.

11. SOCIAL HISTORY : Unsafe sexual contact may lead to AIDS (Hairy leucoplakia of oral cavity is highly suggestive of AIDS).

12. GENERAL EXAMINATION :

- Examine pulse, blood pressure, cyanosis, clubbing, anaemia, jaundice and the lymph nodes.
- Hypertension may cause epistaxis, cyanosis is present in advanced laryngeal and bronchial malignancy, clubbing is present in bronchial carcinoma and anaemia is present in recurrent epistaxis.

- Examination of lymph nodes - Make the patient comfortably seated on the chair and examiner stands behind the patient, flex the neck of the patient slightly and start palpating on both sides systematically and symmetrically, starting with submental, submandibular, jugulo-digastric, jugulo-omohyoid, preauricular, postauricular, occipital, and the vertical chain of lymph nodes at carotid region etc. Palpate on both the sides of neck even if lesion is unilateral.



HISTORY & EXAMINATION OF EAR

COMPLAINTS

Complaints are being recorded in the chronological order i.e. the complaint, which occurred first, should be recorded first, the subsequent complaints next in the descending order.

For example :

➤	Ear discharge	for last 2 years,
➤	Deafness	for last 1 year,
➤	Vertigo	for 8 months,
➤	Pain, headache	for 4 months,
➤	Ringing in the ear	for 15 days,
➤	Facial asymmetry	for 5 days.

The complaints should be recorded in that order only, as discharge was the first complaint so it should be recorded first followed by deafness, vertigo, pain, headache and so on.

HISTORY OF PRESENTING ILLNESS

- (i) Discharge
- (ii) Deafness
- (iii) Vertigo
- (iv) Pain
- (v) Tinnitus
- (vi) Autophony
- (vii) Facial nerve palsy
- (viii) Fever
- (ix) Headache

(i) Discharge : Following points are to be observed :

1. Smell :

- Foul smelling discharge indicates unsafe otitis media (suspicion of cholesteatoma). Safe otitis media can also have foul smelling discharge if it is secondarily infected.
- Non-foul smelling discharge indicates safe type of otitis media.

2. Consistency :

- If discharge forms a string, it indicates the discharge from the middle ear as mucus secretory glands (Goblet cells) are present only in the middle ear.
- If discharge is non-string forming it indicates discharge from the external ear, as no mucus secretory glands are present in the external ear. This discharge may be due to furunculosis or rarely from the parotid abscess.

3. Colour :

- The normal colour of pus is creamish yellow. In pseudomonas infection it is greenish in colour.

4. Blood Stained Discharge :

- In tubotympanic type disease, the discharge is not blood stained. If it is blood stained, it indicates presence of granulation tissue in the middle ear, which is more common in atticoantral type of otitis media. The blood stained discharge may also present in underlying malignancy.

5. Watery Discharge :

- Clear watery discharge occurs in C.S.F. otorrhoea.

6. Quantity :

- Scanty discharge indicates atticoantral type of disease while moderate to profuse discharge points towards tubotympanic type of otitis media.
 - Profuse Discharge : If discharge comes out of ear canal and stains the pillow during sleep.
 - Moderate Discharge : If discharge remains in the external auditory canal.
 - Scanty Discharge : If the tip of swab stick is stained by the discharge.

7. Active / Inactive / Quiescent Stage of Discharge :

- Active Stage : If discharge is present.
- Inactive Stage : If discharge is not present for minimum 3 to 6 weeks.
- Quiescent Stage : If discharge is absent for a few days, but reappears in-between and again.

(ii) Deafness : Following points are to be observed :

1. Sudden or Gradual Deafness : Gradual deafness occurs in C.S.O.M. while sudden deafness occurs in viral diseases or in fracture of the temporal bone.
2. Degree of Deafness : Mild, moderate or severe type of deafness.
(Details can be found in the tuning fork test)
3. Fluctuation of Deafness : Fluctuating deafness occurs in secretory otitis media as different head position causes difference in deafness specially when fluid is thin. Hearing is usually better in supine position when patient is lying on the bed but alters on getting up (erect position). Fluctuation of deafness also occurs in Meniere's disease and in perilymph fistula.
4. Deafness at the Time of Discharge : Does deafness increases or decreases at the time of discharge ? Usually at the time of discharge deafness should increase as it means flare-up of disease. But in case of ossicular disruption, discharging fluid inside the middle ear causes good medium for the sound transmission and patient may find improvement of hearing at the time of discharge.
5. Deafness at Crowded Place : In otosclerosis, patient hears better in the crowded place, this is called Paracusis Willisii.
6. Distortion of Sound : Sound is heard at different pitch in the affected ear. It is called diplacusis and occurs in Meniere's disease.
7. Alteration of Deafness with Vertigo : In Meniere's disease before the onset of vertigo, deafness increases but returns to normal after the attack of vertigo. But with every subsequent attack of vertigo, hearing deteriorates and deafness increases (which is of sensorineural type).

(iii) Vertigo : It is the false sense of orientation.

Following points are to be observed :

1. Presence or Absence of Vertigo : Presence of vertigo with ear discharge indicates intracranial or threatening intracranial complications.
2. Types of Vertigo : Patient himself is moving, the surrounding is moving, sense of unsteadiness, sensation of to-and-fro, up-and-down movement or falling off suddenly (known as "drop attacks" or "utricular crises").

All these types of vertigo are present in Meniere's disease.

(Meniere's Disease - it is a disorder of endolymphatic labyrinth characterized by attacks of vertigo, deafness and tinnitus.)

3. Vertigo in Particular Position : Benign positional paroxysmal vertigo (B.P.P.V.) causes vertigo in particular head position.
4. Vertigo with Deafness : Deafness increases before the onset of vertigo in Meniere's disease.
5. Vertigo without Deafness : Occurs typically in vestibular neuronitis.
6. Vertigo associated with Neck Movements : In cervical spondylosis, compression of vertebral artery by the osteophytes may cause vertigo.

(iv) Pain :

1. Nature of Pain : Sharp, throbbing or lancinating pain occurs in acute otitis media. Continuous, dull throbbing pain occurs in furunculosis of ear.
2. Site of Pain :
 - Pain in front of ear at tragus is probably due to furunculosis.
 - Pain deep inside the ear is probably due to middle ear.
 - Pain behind the ear at the mastoid tip may be due to infected gland at the mastoid region.
 - Pain below the ear in the cleft between ramus of mandible and mastoid process is frequently due to the eustachian tube infection (called salpingitis) or it may arise from the parotid region.

Referred Pain : *(Remember five T's for referred otalgia)*

(1) Tongue, (2) Teeth, (3) Tonsil, (4) Temporo-mandibular joint, (5) Throat i.e. pharynx and larynx.

(Referred otalgia occurs as the sensory centre of the mandibular nerve receives impulses from the lingual as well as auriculotemporal nerve.)

3. Chewing Movement : Chewing movement increases the pain in furunculosis.

(v) Tinnitus :

It is the subjective sensation of sound in the ear. Just as pain is the sign of irritation of the sensory nerves, tinnitus is the sign of irritation of the cochlear mechanism.

1. Types of Tinnitus :

- a) **Subjective Tinnitus** : Subjective tinnitus is audible only to the patient and usually indicates an abnormality in the
 - i) auditory system, for example acoustic neuroma, Meniere's disease, drugs like aspirin and quinine
 - ii) systemic causes like anaemia, hypertension and diabetes mellitus.
 - b) **Objective Tinnitus** : Objective tinnitus can be heard by examiner as well as by the patient himself and is often due to the pathology outside the ear like palatal myoclonus, glomus tumour.
2. **Unilateral / Bilateral Tinnitus** : Acoustic neuroma produces unilateral tinnitus while in otosclerosis there is usually bilateral tinnitus.
 3. **Tinnitus with Vertigo** : Before the onset of vertigo in Meniere's disease, tinnitus increases and it is at times the warning signal to the patient about impending vertigo.
 4. **Tinnitus with Deafness** : It occurs in Meniere's disease and occasionally in otosclerosis.
 5. **High-Pitched Tinnitus** : It occurs in acute suppurative otitis media.

(vi) Autophony :

Excessive loudness of one's own voice occurs in acute suppurative and non-suppurative otitis media, patulous eustachian tube.

(vii) Facial Asymmetry (Facial nerve palsy) :

1. Facial nerve palsy with ear discharge - In atticotympanic variety of otitis media (unsafe type of otitis media), cholesteatoma may cause facial nerve palsy.
2. Facial nerve palsy with deafness - It occurs in acoustic neuroma.
3. Facial nerve palsy with intact, normal tympanic membrane and without any history of ear discharge occurs in Bell's palsy.

(viii) Fever :

Fever is present in acute suppurative otitis media and acute mastoiditis.

(viii) Headache :

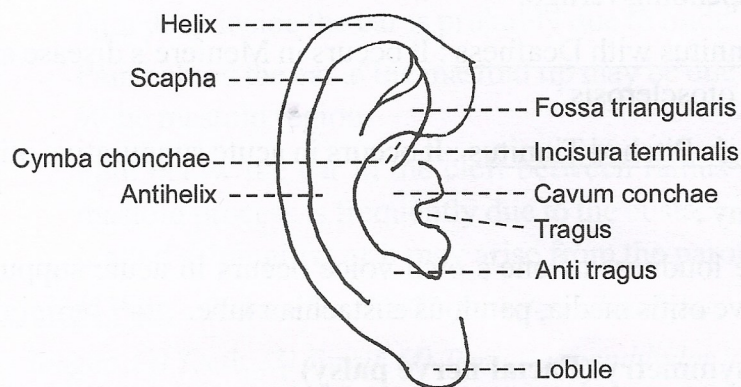
Headache is present in brain abscess and lateral sinus thrombophlebitis.

EXAMINATION OF EAR**(i) Pinna :****1. Size of Pinna :**

- Normal size pinna.
- Large pinna is called macrotia.
- Small pinna is called microtia.
- Absence of pinna is called anotia.

2. Congenital Anomaly like :

- Prominent Darwin tubercle (i.e. tubercle present at upper part of helix)
- Bat ear (i.e. absence of antihelix)
- Wildermuth Ear (when antihelix is more prominent than helix).



- 3. Thickened or cauliflower pinna is the end result of perichondritis of pinna.
- 4. Low Set of Ears : The upper limit of pinna corresponds to level of eyebrow and the lower limit corresponds to the base of alae nasi. The horizontal inter-palpebral line projected posteriorly if it passes above the ear, it suggests the low set of ear. It occurs in Treacher-Collins' syndrome

(Treacher-Collins' syndrome consists of deformed malar bones, lower eyelids notched, deficient lashes medially, microtia and meatal stenosis or atresia with malformation of middle and /or inner ear).

(ii) Pre-Auricular Region : Observe the presence or absence of :

1. Pre-auricular Sinus

(pre-auricular sinus occurs due to the incomplete fusion of auricular tubercle)

2. Accessory Tragus

(Accessory tragus is due to the presence of auricular tubercle on other part of first or second cleft depression).

(iii) Post-auricular region : Observe

1. Scar of previous surgery.

2. Oedema at post-auricular region. It is called Griesinger's sign. It is due to thrombosis of mastoid emissary vein.

3. Any swelling or fistula.

4. Any lymph node.

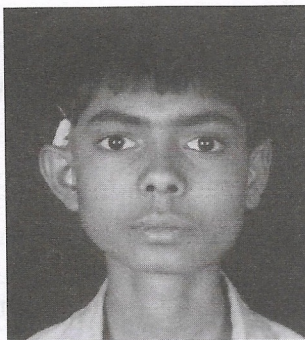
5. Palpate the mastoid process. In acute mastoiditis the periosteum of mastoid process is thickened due to periostitis called 'ironing of mastoid'.

(iv) Post-Auricular Sulcus :

Post-auricular sulcus is obliterated in furunculosis by oedema if the boil is situated on the posterior surface of external auditory canal but post-auricular sulcus is maintained in mastoid abscess.

(v) Protrusion of Pinna :

Pinna is forward and outward in furunculosis while forward, outward and downward in mastoid abscess. ('erection of pinna')



Right pinna in acute subperiosteal mastoid abscess

***Difference between
furunculosis oedema and acute otitis media with mastoiditis***

<i>Furunculosis</i>	<i>Acute otitis media with mastoiditis</i>
1. Presence of boil with normal tympanic membrane	1. There is no boil & tympanic membrane is congested
2. Pain is dull throbbing till boil is incised or bursts with scanty yellow discharge	2. Sharp piercing pain with mucus discharge from the ear
3. Movement of pinna and pressure on tragus increases the pain	3. Not so in otitis media
4. Hearing improves after introducing small size ear speculum	4. Hearing is altered
5. Obliteration of post-auricular sulcus	5. Post-auricular sulcus is not altered
6. Pinna is pushed forward and outward	6. Pinna is pushed forward, outward and downward
7. Both the pinna are at the same level if looked from behind	7. Affected pinna is at a lower level
8. Mastoid x-ray is normal	8. Mastoid x-ray may show cloudiness of mastoid aircells

(vi) Tenderness : Examine the

1. Tenderness at the mastoid process and at the cymba conchae. Tenderness at this region signifies mastoiditis.

Three finger test - keep one finger at cymba conchae, second finger over posterior border of mastoid and third finger at mastoid tip. Maximum tenderness under first finger signifies tenderness over suprameatal triangle.

(The surgical importance of cymba conchae is that suprameatal triangle lies under it and can be felt through it. The mastoid antrum lies deep to the triangle)

2. Tenderness of tragus (Tragus sign) indicates furunculosis at the anterior wall of external auditory canal.
3. Tenderness of pinna indicates perichondritis.
(Tenderness along the course of internal jugular vein in the neck and localized oedema over the thrombosing internal jugular vein is seen in lateral sinus thrombophlebitis.)

***Furunculosis** : It is a staphylococcal infection of hair follicles or sebaceous glands present in the skin of outer cartilagenous part of the external auditory canal. It is treated by antibiotic & local wick of 10% ichthamol glycerine.*

***Mastoidism** : Presence of mastoid tenderness without mastoiditis is called mastoidism. It occurs in acute suppurative otitis media in first few days due to tension in the middle ear. The tenderness disappears after tension is relieved in the middle ear.*

(vii) External Auditory Canal :

Pinna is pulled upwards, outwards and backwards to make external auditory canal straight in adults but in children bony canal is not developed so pinna has to be pulled downwards and backwards to make external auditory canal straight. Examine the external auditory canal for the presence of wax, fungus, discharge, keratosis obturans, osteoma, foreign body or any abnormality like collaural fistula, atresia or fissure of santorini etc.

***Wax** - Wax is the accumulated secretion from ceruminous glands. The impacted wax may cause pain, deafness, tinnitus, and even vertigo. It is softened by glycerine-sodium bicarbonate ear drops and removed by aural syringing.*

***Fungus** - It is called otomycosis. It is caused by *Aspergillus niger* (black coloured) and *Candida albicans* (white coloured).*

***Collaural Fistulas** - It has an upper opening in the floor of external auditory meatus and a lower opening behind the angle of jaw at the anterior border of sternomastoid.*

***Exostoses** - It is the most common benign tumour in the meatus. It arises from the posterior wall of bony meatus as rounded swelling. The repeated entry of cold water into the external meatus in swimming and diving is the primary cause of this condition.*

***Keratosis Obturans** - In this condition meatus is blocked by a mass consisting of wax, desquamated epithelium and cholesterol. Its pressure effect causes absorption of bone and widening of the meatus. Mass is softened by sodium bicarbonate ear drop followed by syringing. Removal of mass is difficult and require general anaesthesia. The regular observation is necessary to prevent the reformation.*

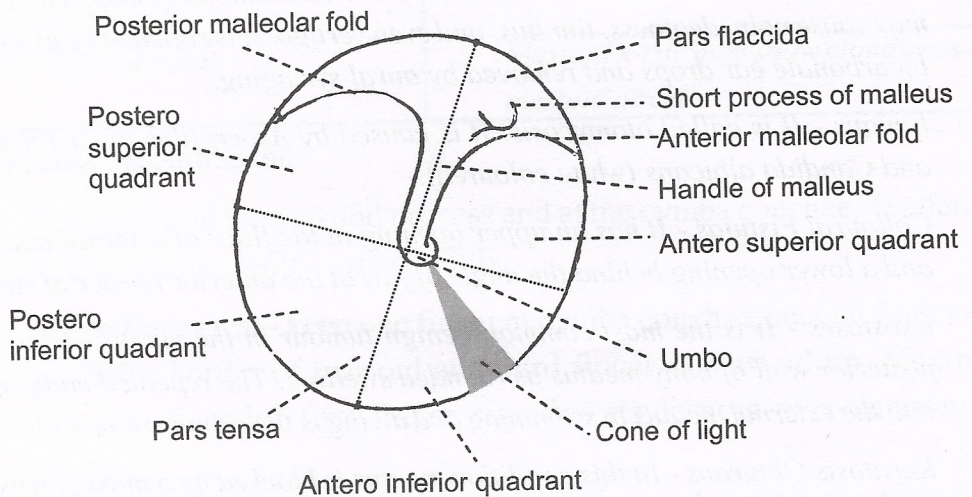
***'Malignant' Otitis Externa** - It usually occurs in elderly diabetic patient. Granulation tissue is found in the meatus at the junction of cartilagenous and bony canal. Seventh cranial nerve palsy may occur which is a bad prognostic sign. The treatment consists of aural toilet, local and intravenous gentamicin.*

Fissure of Santorini - It is the deficiency of cartilagenous meatus and may provide a pathway for infection between the parotid gland, the external auditory canal and superficial mastoid tissue.

Foreign bodies in the Ear - It may be insect-living or dead, maggots or plastic objects or food grain. It is removed by aural syringing.

(viii) Tympanic Membrane :

The tympanic membrane separates the external ear from the middle ear and functionally is part of middle ear. It is pearly grey in colour and oval in shape measuring about 9 mm. in the horizontal and about 10 mm. in vertical diameter. Total area of tympanic membrane is about 90 sq.mm. with an effective vibrating area of 55 sq.mm. The tympanic membrane at its periphery is attached to a bony ring called annulus tympanicus. The bony ring is deficient above - the notch of Rivinus and the drum attached to this part is called Pars Flaccida or Shrapnell's membrane. (The Shrapnell's membrane is flaccid hence it is called Pars Flaccida.) The rest of drum is called Pars Tensa.



Right tympanic membrane

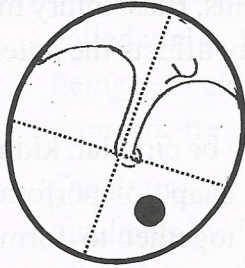
Observe following things :

1. **Colour** : Red and congested tympanic membrane is found in acute suppurative otitis media. Pale and amber colour tympanic membrane may be found in few cases of secretory otitis media. Flamingo-pink blush (Schwartz sign) is seen in 10% cases of otosclerosis. It indicates active phase of the disease.

2. Perforation :

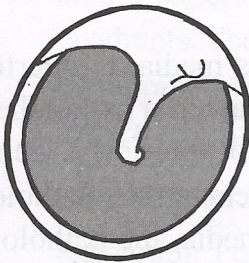
i. Types of Perforation : Central, Marginal or Attic Perforation.

Central Perforation



Central perforation is that perforation which is found in pars tensa and surrounded all around by tympanic membrane. It is found in tubotympanic type of otitis media (which is also called safe type of otitis media.)

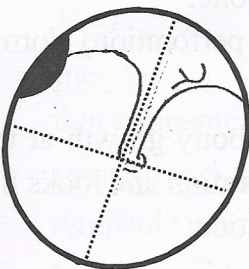
Subtotal Perforation



Subtotal perforation - It is the large central perforation and annulus is present only as a rim.

Total perforation - When annulus is not present and destroyed all around.

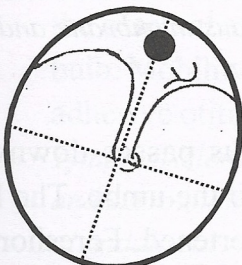
Marginal Perforation



Marginal perforation is that perforation which is not surrounded all around by tympanic membrane.

It is usually associated with secondary acquired cholesteatoma.

Attic Perforation



Attic perforation is situated in the attic region. It indicates primary acquired cholesteatoma.

Marginal and attic perforations are found in atticoantral type of otitis media (which is also called unsafe type of otitis media).

- ii. Number : Multiple perforations occur in tuberculous otitis media.
 - iii. Size of Perforation : Mention the approximate size of perforation in mm.
 - iv. Margin of Perforation : CSOM has smooth perforation while traumatic perforation has ragged margins. Blast injury may rupture the tympanic membrane and generally affects the antero inferior quadrant.
 - v. Shape of Perforation : Perforation may be circular, kidney shaped or oval shaped. CSOM has circular shape of perforation. Two small central perforations may join together to form a kidney shaped perforation. Traumatic perforation has altogether different shape depending on the type of trauma.
 - vi. Site of Perforation :
 - In tubotympanic type of otitis media, the perforation is usually (not necessarily) at the anterior half of the quadrant as eustachian tube is situated anteriorly. This type of perforation is due to the eustachian tube pathology.
 - In atticoantral type of otitis media, the pathology lies in attic or at mastoid region so the perforation is usually (not necessarily) in attic or posterior half of tympanic membrane and it indicates the caries of bone.
 - vii. Middle Ear Mucosa : (as seen through perforation) Normal middle ear mucosa is pink & velvety.
 - viii. Coralisation : These are the normal bony growth at the medial wall of middle ear seen through perforation and looks like corals. These are insignificant bony coralisation.
 - ix. Any discharge through perforation
(Permanent perforation -This type of perforation is confined to pars tensa of tympanic membrane and does not involve fibrous annulus. It seldom heals, as there is fibrous ring at the junction of the mucous membrane and the outer layer of tympanic membrane.)
3. Handle of Malleus : The handle of malleus passes downward and backwards from the short (lateral) process to the umbo. The handle of malleus can be normal, shortened or foreshortened. Foreshortening of handle of malleus means it appears to be shortened but infact it is not.

4. Cone of Light : The cone of light (light reflex) extends downward and forward from the umbo to the antero inferior quadrant of tympanic membrane. It is being produced by the reflection of light. Tympanic membrane has angle of 55° with the horizontal and is retracted medially. The point of maximum retraction at the centre of tympanic membrane is called umbo. When outside light falls slightly away from the centre, it is being reflected as cone of light. Normal cone of light indicates normal tympanic membrane.
5. Quadrants of Tympanic Membrane : The pars tensa is divided into 4 quadrants by drawing an imaginary line extending downwards from handle of malleus and one more imaginary line at right angles to the first line at the umbo, thus dividing the tympanic membrane into 4 quadrants named antero superior, antero inferior, postero inferior and postero superior quadrants. These quadrants are for the purpose of describing the tympanic membrane. Any pathology of tympanic membrane like perforation or retraction or granulation should be mentioned quadrant wise.
6. Granulation or Polyp : (described at the end of this chapter Page No.27)
7. Retraction Pocket : Usually (not necessarily) at the postero superior quadrant. Retraction pocket requires regular cleaning and suction otherwise it may lead to the cholesteatoma formation. (Refer Page No. 183)
8. Incudostapedial Joint : is usually not seen. It may be seen in retracted or thin tympanic membrane.
9. Congestion : In acute suppurative otitis media, 'cartwheel' appearance of tympanic membrane is seen.
10. Mobility of Tympanic Membrane : The mobility of tympanic membrane can be assessed by Valsalva's method or by Siegle's pneumatic speculum. Sieglisation is done by introducing Siegle's pneumatic ear speculum in the external auditory canal and blowing the air through attached rubber bulb. Mobility of tympanic membrane is reduced in tympanosclerosis and adhesive otitis media. The mobility is almost absent in atelectasis.
Tympanosclerosis - White plaques (chalk patch) in the tympanic membrane and surrounding the ossicles. There is hyaline degeneratoion of fibrous layer of middle ear mucosa which undergo calcification appears like flakes of white snow.

Adhesive Otitis Media - The entire tympanic membrane is thinned out due to degeneration of fibrous layer and adhesion is formed between tympanic membrane, middle ear and ossicles resulting in deafness.

Atelectasis -The entire posterior half of tympanic membrane is plastered over the medial wall of middle ear and drape the ossicles in the posterior quadrant (atelectatic drum)

The various methods to know the patency of eustachian tube are -

- (i) Valsalva's method
- (ii) Toynbee's test
- (iii) Politzer's method
- (iv) Eustachian tube catheterization

- (i) Valsalva's Method or Auto-Inflation : Ask patient to close his mouth and pinch the nose by hand and blow. The air reaches the middle ear through patent eustachian tube.

(Valsalva's manoeuvre was not his invention but he has been credited for popularising the test and for using it in practical situation. He divided the eustachian tube into cartilaginous and bony part first time.)

- (ii) Toynbee's Test : Ask patient to swallow while his nose is held closed, middle ear pressure increases momentarily and then decreases. Positive Toynbee's test indicates patent eustachian tube.

(Toynbee's test was discovered by Toynbee Joseph who found that eustachian tube opens only with swallowing and yawning. Toynbee believed that it is possible to treat the tinnitus of ear by inflation of middle ear through eustachian tube. He subjected himself to test by inhaling vapours of hydrocyanic acid and chloroform and subsequently was found dead in his consulting room.)

- (iii) Politzer's Method : The nozzle of the Politzer bag is inserted into one nostril of the patient and then both the nostrils are tightly closed by surgeon. The patient is given a sip of water and asked to swallow, and the bag is squeezed simultaneously. Patient may feel air reaching in his ears. This method causes aeration of both eustachian tube and is not selective for any one eustachian tube.

- (iv) Eustachian Tube Catheterization - Eustachian tube is catheterized by the eustachian tube catheter and the air is pumped through the air bulb. This test is not performed routinely as it is the blind procedure and may lead to scarring and further blocking of eustachian tube opening.

(ix) Fistula Test :

This test is done by the Siegle's pneumatic speculum where we increase and decrease the pressure in external auditory canal alternately. We can also do it by pressing and releasing the tragus alternately over the external auditory canal. The increased pressure is transmitted to the labyrinthine fluid through fistula which causes vertigo and nystagmus.

(Fistula occurs due to the damage of bony wall of semicircular canal with the exposure of endosteum. Horizontal semicircular is the most common site of fistula by cholesteatoma. In typical fistula test nystagmus is produced to the diseased side i.e. slow movement of eye towards healthy side and fast component of nystagmus towards diseased side. The reverse fistula occurs due to undue mobility of stapes, in which fast component of nystagmus is towards the healthy side. This is called Hennebert's sign and occurs in congenital syphilis. The reverse fistula also occurs in 30% cases of Meniere's disease, post stapedectomy or traumatic perilymph leak.)

<i>If fistula present</i>	<i>& fistula sign positive</i>	<i>Occurs in cholesteatoma</i>
<i>If fistula absent</i>	<i>& fistula sign positive</i>	<i>Occurs in congenital syphilis</i>
<i>If fistula present</i>	<i>& fistula sign negative</i>	<i>Occurs in dead ear</i>

(x) Examination of Facial Nerve

Facial nerve is examined by asking the patient to

- raise the eyebrows,
- close the eyes tightly,
- blow the cheek,
- whistle,
- stretch the neck etc.

The main muscles affected in facial nerve paralysis are :

- Occipitofrontalis (*This muscle raises eyebrows*)
- Orbicularis oculi (*This muscle closes eye*)

3. Corrugators and Procerus (*These muscles wrinkles skin between eyebrows and frowns*)
4. Zygomaticus, levator anguli oris, levator labii superioris (*They raise the corner of mouth and upper lip*)
5. Buccinator (*This muscle keeps the cheek against the teeth during mastication and sucking. It is also for the blowing of cheek*)
6. Orbicularis oris (*This muscle closes the mouth*)
7. Risorius (*This muscle pulls the angle of mouth back, as in grinning*).
8. Depressor anguli oris and depressor labii inferioris - (*These muscles pull down the angle of mouth and the lower lip*)
9. Mentalis (*This muscle wrinkles the chin and is very important in drinking because it holds the lower lip on the cup and prevents dribbling*)

(x) Tuning Fork Tests

- Rinne's Test
- Weber's Test
- Absolute Bone Conduction test (A.B.C.)

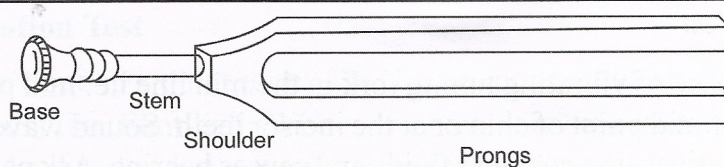
Rinne's - Positive / negative.

Weber's - Lateralised to the diseased ear or to the normal ear.

Absolute Bone Conduction Test - Reduced or not reduced ?

TUNING FORK TESTS

Tuning fork test is done to know the type of deafness i.e. conductive or sensorineural deafness and the degree of deafness. There are several frequencies of tuning forks available but in E.N.T., only the series of tuning fork of 256, 512 & 1024 frequency are used to know the level of deafness. In routine 512 frequency tuning fork is used as it falls in mid speech frequency range & its tone decay is minimal and there is no overtone. Less than 256 frequency tuning fork is better felt than heard, hence for the C.N.S. examination 128 frequency is used. 256 and above frequency is better heard than felt so more useful in E.N.T. practice. 1024 frequency tuning fork is used to estimate cochlear function.



Tuning fork was invented by John Shore in 1711. It is made up of steel alloy or aluminium. It has two prongs, shoulder, stem and a base. Two types of tuning forks are available :

- (i) Hartman's Tuning Fork
- (ii) Gardiner Brown Thumb Rest Tuning Fork

(i) Rinne's Test

Strike the prongs of tuning fork gently at the firm surface like elbow, patella or sole of shoe and place vibrating prongs of tuning fork about 2 cm. away from external auditory canal for the air conduction. The moment patient stops hearing the sound, the base of the vibrating tuning fork is transferred to the mastoid process for the bone conduction. The same thing is done again in the reverse order i.e. first start from the mastoid process (bone conduction) and when patient stops hearing the sound, it is transferred to the external auditory canal for the air conduction. Normally tuning fork is heard twice as long by AC as by BC. (If one strikes tuning fork too hard and at hard surface like table, it produces overtone & too intense sound.)

- Rinne's Positive : When the patient hears the vibration of air conduction better than bone conduction. i.e. AC is better than BC (It occurs in normal subjects & in sensorineural deafness.)
- Rinne's Negative : When the patient hears the vibration of bone conduction better than the air conduction i.e. BC is better than AC (it occurs in conductive deafness. Rinne's test becomes negative only if conductive hearing loss is greater than 15 decibel).
- False Rinne's Negative : Rinne's test is negative in the affected ear but Weber's test is not lateralised in the diseased ear rather lateralised to the better ear, it occurs in severe unilateral sensorineural deafness.
- Rinne's Equal : Air conduction and bone conduction are heard in equal intensity. It occurs in mild conductive deafness.
- Rinne's infinitive : If patient hears only air conduction but no bone conduction.

(ii) Weber's Test

Place the base of vibrating tuning fork in the mid line i.e. mid point of forehead or vertex or mid point of chin or at the incisor teeth. Sound waves travel through the skull, activate the cochlear fluids and causes hearing. Ask patient, which side it is heard.

- In Conductive Deafness : It is lateralised to diseased ear.(The reason is that patient does not get the outside ambient noise in conductive deafness and gets the sound only from the vibration through the bone. It becomes lateralised in affected ear in conductive deafness when hearing loss is 5 decibel or more).
- In Sensorineural Deafness : It is lateralised towards better ear.(The reason is that in sensorineural deafness, sound is not transmitted through diseased cochlea and passes through the normal ear so it is referred to the better ear).

(iii) Absolute Bone Conduction Test (ABC Test)

Ask patient to close his external auditory canal by pressing the tragus by finger and place the vibrating tuning fork at the mastoid process. When patient stops hearing the sound it is brought at the examiner's mastoid process while keeping the external auditory canal closed by pressing the tragus by the self-finger. This test is based on the presumption that examiner's hearing is normal.

- ABC reduced - in sensorineural deafness.
- ABC not reduced - in normal ear and in conductive deafness.

(iv) Schwabach Test

This test is done in the same manner as the absolute bone conduction test but in this test external auditory canal is not blocked by finger. The interpretations are the same as of absolute bone conduction.

The other tests available for hearing assessment are :

(i) Series of Tuning Fork Test

It is done to know the degree of deafness. If Rinne's test is :

- Negative with 256, positive with 512 & 1024 = 20 - 30 dB deafness
- Negative with 256 & 512, positive with 1024 = 30 - 45 dB deafness
- Negative with 256, 512 & 1024 frequency = 45 - 60 dB deafness

(ii) Conversation Test

It must be done in a quiet room. Bisyllabic spondee words (i.e. equal stress on both words) like Foot-ball, White -wash etc. are repeated at the distance of 6 meters. The threshold of normal hearing at the distance of 1 meter is 0 dB, that of whisper is 30 dB, normal conversation is 60 dB, shout is 90 dB and discomfort at 120 dB.

(iii) Audiometry

- *Subjective Audiometry : In these tests, patient's cooperation is needed.*
 - 1) *Pure tone audiometry*
 - 2) *Bekesy self-recording audiometry*
 - 3) *Speech audiometry*
- *Objective Audiometry : In these tests, patient's cooperation is not required*
 - 1) *Impedance audiometry*
 - 2) *B.E.R.A. (Brainstem Evoked Response Audiometry)*

***Difference between
Conductive Deafness and Sensorineural Deafness***

		<i>Conductive Deafness</i>	<i>Sensorineural Deafness</i>
1.	<i>Voice</i>	<i>Low tone</i>	<i>High tone</i>
2.	<i>Noise tolerance</i>	<i>Absent</i>	<i>Present</i>
3.	<i>Tuning fork test</i> ➤ <i>Rinne's test</i> ➤ <i>Weber's test</i> ➤ <i>ABC (Absolute Bone Conduction) test</i>	<i>Negative</i> <i>Lateralised to diseased ear</i> <i>Not Reduced</i>	<i>Positive</i> <i>Lateralised to better ear</i> <i>Reduced</i>
4.	<i>Pure tone audiometry (PTA)</i>	<i>Good air bone gap</i>	<i>No air bone gap</i>
5.	<i>Recruitment</i>	<i>Absent</i>	<i>Present</i>
6.	<i>Speech audiometry</i>	<i>Good discrimination</i>	<i>Poor discrimination</i>
7.	<i>Speech discrimination</i>	<i>Good</i>	<i>Poor</i>

Hearing Aid

It is a device which amplifies the sound. The aim of hearing aid is to help a deaf person to hear and identify desired sounds, including speech especially his own by selective amplification. It consists of microphone, amplifier, receiver (earphones). The different types of hearing aids are :

- *air conduction hearing aids (programmable digital hearing aids are the most advanced hearing aids which provides much clear sound).*
- *bone conduction hearing aids.*
- *implantable hearing aids (Bone Anchored Hearing Aid [BAHA])*

Hearing aids can be body worn, spectacles mounted, in the ear canal and behind the ear canal types.

Difference between Cochlear Deafness and Retro-Cochlear Deafness

		<i>Cochlear Deafness</i>	<i>Retro-Cochlear Deafness</i>
1.	<i>Recruitment</i>	<i>Present</i>	<i>Absent</i>
2.	<i>Short increment sensitivity index (SISI)</i>	<i>High percentage (60%)</i>	<i>Low percentage (20%)</i>
3.	<i>Tone decay</i>	<i>0 - 20 dB</i>	<i>More than 20 dB</i>
4.	<i>Bekesy audiometry</i>	<i>Type-II curve</i>	<i>Type-III curve</i>
5.	<i>Speech discrimination</i>	<i>Unable to reach high score (50-70 % maximum)</i>	<i>Poor discrimination score</i>
6.	<i>B.E.R.A.</i>	<i>Normal interval between Wave I & V</i>	<i>Wave V delayed or absent</i>

Cochlear Implant

Cochlear implant is the most recent advancement in otology. It is done in severely hearing affected patients whose cochlea has been damaged (congenital, prelingual or post-lingual deaf patients). It is very effective in children especially prelingual deaf child. In successful cochlear implant, the development of speech is very promising. It consists of microphone, speech processor, induction coil and electrode. The microphone and speech processor are worn outside the body, electrodes are placed inside the cochlea and induction coil connects them. This surgery is done by mastoidectomy, posterior tympanotomy or transcanal approach. The multichannel electrodes are introduced in cochlea after making opening in cochlea (cochleostomy) under high magnification of operative microscope. After the surgery patient requires prolonged and multiple sessions of speech therapy.

DIAGNOSIS

It should be framed in the following manner :

Unilateral / bilateral, Chronic suppurative otitis media, Tubotympanic type (Safe type) / Atticoantral type (Unsafe type), Active / Inactive / Quiescent, with or without intracranial or extracranial complications.

INVESTIGATIONS

Radiography

➤ X-Ray Mastoid Schuller's View :

It is the lateral view of mastoid with 30° cephalocaudal angulation. It gives undisturbed view of mastoid bone with its air cells, tegmen, attic with head of malleus, lateral sinus, anterior wall of temporomandibular joint and external auditory meatus.

In acute mastoiditis, air cells become cloudy and have honeycomb appearance and can be called coalescent mastoiditis. If any osteolytic lesion is present, it is suggestive of cholesteatoma. It also gives information about status of dural plate and sinus plate whether it is low lying dural plate or forward lying sinus plate. There are three types of definite mastoid process.

1. *Cellular - Air cells are large and numerous.*
 2. *Diploic - Air cells are small and less numerous. Marrow space is present.*
 3. *Sclerotic - Cells and marrow spaces are absent.*
- 80% mastoids are pneumatic and 20% are diploic or sclerotic.*

There are 3 main theories for the deficient pneumatization -

1. *Tumarkin - It is frustration of pneumatization due to blockage of eustachian tube and failure of aeration of middle ear cleft. Upper respiratory catarrh is the cause.*
2. *Diamant and Dahlberg - Dense bone is congenital and all sizes of air cells are normal variants.*
3. *Wittmaack - Dense mastoid due to infantile otitis media, which interferes with the normal absorption of diploe and pneumatization.*

MANAGEMENT

- (i) Tubotympanic (safe) type of Otitis Media
- (ii) Atticoantral (unsafe) type of Otitis Media

(i) Tubotympanic type of Otitis Media (Safe type)

This is benign type of CSOM confined only to the middle ear cleft.

1. Aural Toilet :

- Dry Mopping - Take a dry ear swab stick and mop out the discharge.
- Wet Cleaning - Clean the discharge with saline. But chances of introducing the infection are very high hence not used commonly.
- Suction Clearance - Very effective but requires suction machine.

2. Ear Swab for Culture & Sensitivity :

Discard the outermost discharge as it may have the contamination. Take the swab from the discharge at the deeper part.

3. Broad-Spectrum Antibiotics :

Ampicillin or Amoxycillin till culture sensitivity report comes. Afterwards start antibiotic as per C/S report. The commonest organisms are H. influenza in children and Staph. aureus and Streptococcus in adults.

4. Local Antibiotic Ear Drops :

First clean the discharge, instil ear drops in ear and then press the tragus repeatedly. This method is called 'displacement method' of using eardrops. Steroid eardrops help to reduce the local inflammation and oedema.

5. Systemic Antihistamines and Decongestants :

Desloratidine or cetirizine with pseudoephedrine

6. Local Decongestant Nasal Drops :

(1% ephedrine saline nasal drops or xylometazoline nasal drops).

Ask patient to lie down without pillow. Instil 2-3 nasal drops and turn the head towards affected side. The nasal drops have local decongestant effect on the eustachian tube.

7. Protection of Ear from Water :

Patient should put cotton swab impregnated with vaseline, glycerine or any edible oil to prevent the entry of water inside the ear during bathing. During swimming, patient should wear earplugs. If patient takes bath in the pond, he should avoid head dipping or should close his nose with fingers and ear with thumb to prevent the entry of water inside the nose and the ear.

8. Treat the Septic Foci :

Usually septic foci are in tonsil or adenoid in children and nose or sinuses in adults. (Deviated nasal septum may lead to sinusitis)

9. Tympanoplasty :

It is done when ear is dry. If patient does not want surgery immediately, he should protect the ear from water entering inside the ear as described above.

(ii) ATTICOANTRAL TYPE OF OTITIS MEDIA (Unsafe Type)

The atticoantral disease involves the attic, antrum and the posterior tympanum. It is a bone eroding disease. The important pathological feature is the formation of cholesteatoma and inflammatory granulation tissue, which causes erosion of bone.

- 1) Aural Toilet : (Same as above)
- 2) Ear Swab for Culture & Sensitivity (Same as above) :

Gram-negative organisms such as *Bacillus pyocyanea*, *Bacillus proteus*, and *Bacillus coli* are the commonest organisms.

- 3) Broad-Spectrum Antibiotics :

Quinolone group like ciprofloxacin, levofloxacin are the commonest antibiotics used. It is better to add metronidazole or tinidazole along with this to cover the anaerobes.

- 4) Removal of Granulations or Polyp : (if any)
- 5) Surgery : Radical or modified radical mastoidectomy, as this type of otitis media is associated with cholesteatoma.

Polyyps

Polyyps are not a new growth. They are oedematous mucus membrane, pear shaped and have a long pedicle. Aural polyp may arise from (1) promontory (2) tympanic ring (3) around eustachian tube opening (4) attic space (5) mastoid antrum.

The information about the origin of polyp is very important. The polyp may be attached to the stapes superstructure or to the facial nerve. The polyyps arising from promontory or from the region of eustachian tube may not recur but those polyyps arising from attic space or mastoid antrum are almost bound to recur because of difficulty in getting the access of their root. Recurrence is also common in the polyp arising from the tympanic ring as it is arising from the caries of bone in that site. They are removed by aural snare. Recurrence usually requires mastoid surgery to eradicate the underlying disease. If massive bleeding occurs during removal of polyp consider the possibility of glomus jugulare tumour.

Granulation tissue

They are the red sessile growth situated on the medial wall of middle ear. They may also grow from tympanic membrane or posterior meatal wall adjacent to the drum. They are removed either by curettage or chemical cautery by silver nitrate or copper sulphate. Recurrence requires mastoid surgery to eradicate the underlying disease.

Otitis MediaClassification of Otitis Media

Otitis media can be classified as :

1. *Suppurative*
 - a. *Acute*
 - b. *Chronic*
 - i. *Tubotympanic type (safe type)*
 - ii. *Atticoantral type (unsafe type)*
2. *Nonsuppurative*
 - a) *Acute*, b) *Chronic*, c) *Adhesive*

Classification Chronic Otitis Media (New)

<i>Healed chronic otitis media</i>	<i>Healed perforation or tympanosclerosis</i>	<i>Thinning of pars tensa without perforation</i>
<i>Inactive (mucosal) chronic otitis media</i>	<i>Perforation of tympanic membrane</i>	<i>Perforation of tympanic membrane (Pars tensa) without inflammation of middle ear mucosa</i>
<i>Inactive (squamous) chronic otitis media</i>	<i>Retraction of tympanic membrane</i>	<i>Retraction of tympanic membrane mainly posterior-superior quadrant</i>
<i>Active (mucosal) chronic otitis media</i>		<i>Perforation of tympanic membrane (Pars tensa) with inflammation of middle ear mucosa</i>
<i>Active (squamous) chronic otitis media</i>	<i>Cholesteatoma</i>	<i>Retraction of tympanic membrane with purulent discharge</i>

Acute Suppurative Otitis Media (ASOM)

It is an acute suppurative inflammation of the middle ear cleft.

Clinical Features :

1. *Stage of hyperaemia : Deafness, autophony, feeling of fullness.*
2. *Stage of exudation : Bulging of tympanic membrane, deafness, fever, pain in the ear. Cart-wheel appearance of tympanic membrane.*
3. *Stage of perforation : Discharge from ear. Pulsating discharge from ear may reflect the light intermittently called 'Light-house sign'.*
4. *Stage of complication : Facial nerve paralysis, labyrinthitis etc.*
5. *Stage of resolution : There is complete resolution with adequate treatment.*

Treatment :

- *Medical Treatment : In the form of antibiotics, antihistamines, nasal*

and systemic decongestants.

- *Surgical Treatment : Myringotomy i.e. making an incision in the tympanic membrane either by a radial incision (more preferred) or a J-shaped incision.*

(The middle ear cleft consists of tympanic cavity, aditus, mastoid antrum and the eustachian tube.)

The contents of middle ear are :

- *Three ossicles - malleus, incus and stapes.*
- *Two muscles - tensor tympani (supplied by a twig from the mandibular division of trigeminal nerve) and stapedius muscle (supplied by the facial nerve).*
- *Two nerves - facial nerve with its bony wall i.e. fallopian canal and chorda tympani nerve.*
- *Tympanic plexus - It is formed by the ramification of the tympanic nerve (Jacobson's nerve) which is a branch of the glossopharyngeal nerve.*
- *Air*

Non-Suppurative Otitis Media (Secretory Otitis Media)

It is a non-suppurative inflammation of the middle ear. There is collection of glue in the tympanic cavity with an intact tympanic membrane. It is also called glue ear. This pathology occurs due to the blockage of eustachian tube causing a negative pressure and absorption of air from the middle ear and there is collection of fluid (consistency like a glue) in the middle ear in the form of exudate. The only complaint of the patient is deafness, which is fluctuating type as fluid moves in the closed tympanum and the deafness alters.

The treatment is :

- *Medical - Mucolytic agents(Ambroxol) for the liquification of glue and nasal decongestants to relieve the oedema of eustachian tube*
- *Middle ear aeration - by repeatedly valsalva manoeuvre.*
- *Surgical - Grommet insertion.*

Grommet is a small dumbbell shaped tube and is placed antero inferior to the handle of malleus on the tympanic membrane. They are extruded by itself due to migration of the epithelium of tympanic membrane. The main purpose of grommet is the ventilation of middle ear rather than drainage. They are also called artificial eustachian tube.



Cholesteatoma

It is the presence of desquamated stratified squamous epithelium at an abnormal place. It is a benign condition but locally malignant. It is infact "Skin at wrong place"(as described by Tumarkin). The various other names to this condition are cholesteatosis, epidermosis, Keratosis or simply destructive ear disease. It causes bone necrosis by various enzymes like collagenase, acid phosphatase and proteolytic enzymes of osteoclasts and may cause even fistula in the medial wall of the middle ear leading to labyrinthitis. Histologically cholesteatoma is divided into two types -

(a) **Cholesterol granuloma** - It develops by the deposition of cholesterol crystals over granulation tissue at the site of suppuration or haemorrhage. It cannot erode the bone so not life threatening,

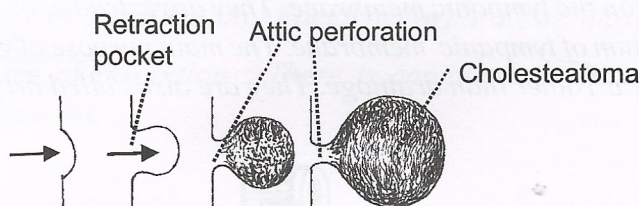
(b) **Epidermoid cholesteatoma** - It has property to erode bone. The commonest site of fistula formation is the promontory. It may also cause erosion of the dural plate and sinus plate leading to meningitis or lateral sinus thrombosis. It is treated by mastoid surgery.

The types of cholesteatoma are :

- 1) Congenital Cholesteatoma : It may arise from an embryonic rest in any bone of skull.
- 2) Acquired Cholesteatoma :
 - a) *Primary acquired cholesteatoma* - arises from attic or postero superior part of middle ear without previous history of otitis media.
 - b) *Secondary acquired cholesteatoma* - with previous history of otitis media. It is readily recognized by the foul smelling discharge and white epithelial debris.

There are various theories for the cholesteatoma formation :

- Negative Middle Ear Pressure Theory : The continued middle ear pressure associated with childhood otitis media and effusion causes negative pressure and retraction of pars flaccida. Gradually retraction increases making a pouch and finally the neck of the pouch closes forming a sac and skin gets trapped inside.



Stages of cholesteatoma formation

- Invasion Theory : There is ingrowth of epithelium from the external auditory canal or from the outer surface of the drum.
- Metaplasia Theory : There is metaplasia of epithelium of middle ear cleft due to chronic suppuration.

Spread of Infection (Suppurative Otitis Media)

- (1) Direct spread by osteitis or erosion by cholesteatoma.
 - (2) Venous Spread.
- Medial Spread : Labyrinthitis through oval window, round window, erosion of lateral semicircular canal or promontory.
 - Superior Spread : To middle cranial fossa leading to extradural abscess or temporal lobe abscess.
 - Posterior Spread : To posterior cranial fossa leading to extradural abscess, cerebellar abscess, septic thrombosis of sigmoid sinus or meningitis.
 - Inferior Spread : Septic thrombosis of internal jugular vein or parapharyngeal abscess.

Complications of Suppurative Otitis Media

The extra-cranial complications are :

- 1) Mastoiditis
- 2) Petrositis - Gradenigo's syndrome : This syndrome consists of -
 - Severe unilateral headache due to the irritation of Gasserian ganglion (trigeminal nerve)
 - Diplopia - 6th nerve palsy due to compression of nerve as passes through Dorello's canal beneath the petrosphenoid ligament at the tip of petrous apex.
 - Otitis media - due to petrositis.
- 3) Subperiosteal abscess
- 4) Labyrinthitis
- 5) Facial nerve paralysis

The intra-cranial complications are :

- 1) *Extradural abscess*
- 2) *Subdural abscess*
- 3) *Cerebellar or temporal lobe abscess*
- 4) *Lateral sinus thrombosis*
- 5) *Meningitis*
- 6) *Otitic hydrocephalus*

Subperiosteal Abscess

(a) *Postauricular Abscess :*

It is the commonest type of abscess especially in children and lies over the external surface of mastoid. The pinna is displaced outwards, forwards and downwards. The postauricular sulcus tends to be retained.

(b) *Zygomatic Abscess :*

Pus from the zygomatic cells form abscess deep to the temporal muscle and swelling is above and in front of the ear.

(c) *Von Bezold's Abscess :*

Perforation of tip cells form the abscess deep to the sternomastoid muscle. The patient develops torticollis & brawny swelling under the upper part of sternomastoid. The downward extension of pus within the sheath of the muscle is also called "the sinking abscess" of the neck.

(d) *Luc's Abscess :*

Pus tracking outwards under the periosteum of the roof of bony canal reaching to sub temporal region.

(e) *Citelli's Abscess :*

Pus travels along the posterior belly of digastric to form abscess in the digastric triangle.

(f) *Pharyngeal Abscess :*

Pus from the peritubal cells may form parapharyngeal or retropharyngeal abscess.

Difference between
Safe Type Otitis Media and Unsafe Type Otitis Media

	Safe Type Otitis Media	Unsafe Type Otitis Media
1. Disease	<i>Tubotympanic type</i>	<i>Atticoantral type</i>
2. Perforation	<i>Central</i>	<i>Marginal or attic</i>
3. Discharge	<i>Intermittent</i>	<i>Continuous</i>
4. Quantity of pus	<i>Profuse</i>	<i>Scanty</i>
5. Character	<i>Mucoid</i>	<i>Purulent</i>
6. Smell	<i>Non foul-smelling</i>	<i>Foul-smelling</i>
7. Cholesteatoma	<i>Absent</i>	<i>Present</i>
8. Granulations	<i>Uncommon</i>	<i>Common</i>
9. Polyp	<i>Pale</i>	<i>Red and fleshy</i>
10. Deafness	<i>Mild to moderate conductive deafness</i>	<i>Conductive deafness or mixed deafness</i>
11. Ossicular necrosis	<i>Absent</i>	<i>Usually present</i>
12. X- ray mastoid	<i>Often cellular</i>	<i>Often sclerotic</i>
13. Complications	<i>Rare</i>	<i>Common</i>
14. Source of infection	<i>Tonsils, adenoid, sinus or nose (D.N.S.)</i>	<i>Mastoid</i>
15. Treatment	<i>Treatment of septic foci and tympanoplasty</i>	<i>Mastoid surgery</i>
16. Prognosis	<i>Good</i>	<i>Not good due to possibility of intra cranial complication unless ear is made safe by removing cholesteatoma completely</i>

HISTORY & EXAMINATION OF NOSE AND PARANASAL SINUSES

COMPLAINTS

Complaints are to be recorded in chronological order as in the ear case.

HISTORY OF PRESENTING ILLNESS

(i) Nasal Discharge :

1. Unilateral / Bilateral Discharge :

- Unilateral foul smelling purulent discharge in children is almost certain of foreign body in nose unless proved otherwise.
- Bilateral discharge is present in Deviated Nasal Septum (DNS), ethmoidal polyps, nasal allergy in adults and adenoid infection in children.

2. Character of Discharge :

- Watery discharge is present in allergic rhinitis
- Clear fluid like discharge is suggestive of CSF rhinorrhoea.
- Mucoid discharge is present in DNS
- Purulent discharge is present in sinusitis.

3. Blood Stained Discharge :

- Blood stained discharge is present in antrochoanal polyp, rhinosporidiosis and malignancy.

(ii) Nasal Obstruction :

This may be unilateral or bilateral :

- Unilateral obstruction may be due to foreign body, hypertrophied inferior turbinate or growth. Unilateral nasal obstruction is also present in an early case of antrochoanal polyp when polyp is present in the nasal cavity, but when polyp reaches nasopharynx it causes bilateral nasal obstruction. The C-shaped D.N.S. initially causes unilateral nasal obstruction on the side of deviation but there is compensatory hypertrophy of inferior turbinate on the other side causing bilateral nasal obstruction.
- Bilateral nasal obstruction is common in allergic rhinitis, vasomotor rhinitis and ethmoidal polyposis.

(Vasomotor rhinitis- there is over activity of parasympathetic over the sympathetic without allergy. The predisposing factors are, heredity, infection, emotional (stress phenomenon), endocrine influence (puberty, menstruation, pregnancy), sexual excitement ('honeymoon rhinitis'), old age and drugs. The precipitating factors are atmospheric conditions, fumes, dust, and alcohol. It is treated by antihistamines, local steroids, submucous diathermy, vidian neurectomy.)

(iii) Falling of Crust : occurs in atrophic rhinitis

(iv) Headache :

Acute sinusitis causes pain at the sinus involved.

- Maxillary Sinus - causes infraorbital pain.
- Frontal Sinus - causes supraorbital pain.

Headache of frontal sinus does not disturb sleep and has characteristic periodicity. It starts in the forenoon, reaches peak in midday and subsides in the evening, after which patient is free from the headache. Vacuum headache results from obstruction of air entry into the frontal sinus.

- Ethmoid Sinus - causes pain over the bridge of nose and between the eyes.
- Sphenoid Sinus - causes occipital, vertical (at vertex) or retro-ocular pain.

Sinus headache accounts for only 5% of total headache.

Ant. ethmoidal neuralgia - High DNS pressing the middle turbinate causes pressure on anterior ethmoidal nerve. It causes pain from eyebrows down the nasal bone. The pain is not severe but makes the wearing of spectacles uncomfortable. This concept was first described by Sluder, so also called "Sluder's neuralgia" or "Anterior ethmoid nerve syndrome".

Headaches "Like a vice" occur in vasomotor rhinitis.

(v) Sneezing :

Sneezing is a protective mechanism and is initiated by an abnormal stimulation of the nasal mucous membrane. Sneezing with watery nasal discharge occurs in nasal allergy.

(vi) Itching of Nose :

Itching of nose along with sneezing and watery discharge is characteristic of nasal allergy.

Nasal allergy is an abnormal reaction of the tissues to certain substances. The causal substances are called 'allergens'.

Allergic salute- repeated itching of the nose in allergic rhinitis might lead to lifting of the tip of the nose upwards with the palm, which looks like salute. Horizontal crease on the dorsum of nose due to repeated allergic salute is called Darrier's Line.

(vii) Disturbances of Smell :

➤ Anosmia : It is loss of smell.

Acute rhinitis may temporarily cause anosmia. Anosmia occurs due to bilateral obstruction to the airflow odour reaching to the olfactory pathway like in severe type of DNS. Fracture of cribriform plate or skull base, cerebral haemorrhage or intracranial tumour may damage the olfactory pathway. Excessive use of tobacco may diminish the olfactory acuity. In atrophic rhinitis initially there is temporary anosmia due to crusts but in advanced stage it becomes permanent.

➤ Parosmia : It is perverted smell. It may occur in skull fracture, intra cranial tumour, peripheral neuritis and after streptomycin injection.

➤ Cacosmia : It is feeling of bad smell due to intrinsic cause like dental infection, malignancy, maxillary sinusitis, foreign body in the nose.

➤ Hyposmia : decreased sensibility of smell. It may occur in old age (presbyosmia), menopause, tobacco smoker and radiation therapy of nose.

➤ Hyperosmia : increased sensibility of smell. It may be found in normal person or in neurotic person, epilepsy, pregnancy and cystic fibrosis.

(viii) Snoring :

It is the sound made by the vibration of the soft palate when patient is asleep, often on his back and during inspiration through the mouth. If any pathological condition like adenoid in children, nasal polyp, hypertrophied turbinate or oedematous mucous membrane of nose or palate is contributing for snoring, it should be corrected. It is difficult to treat habitual snorers. Radio Frequency Ablation is the latest procedure causing stiffening of the soft palate.

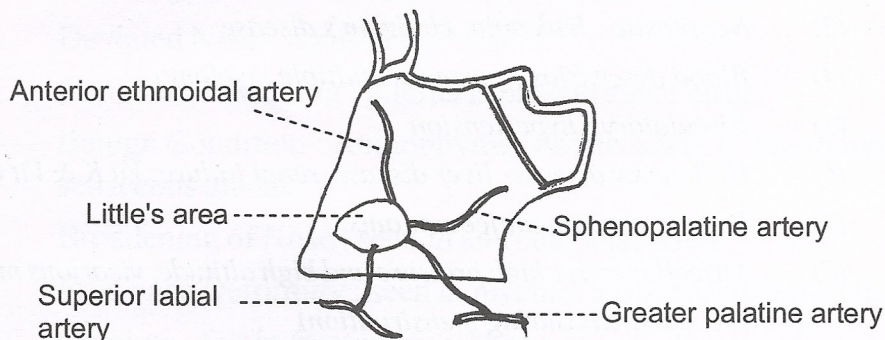
(ix) Epistaxis :

It is bleeding from the nose.

- Little's area is the commonest site of bleeding in hypertension.
(Hypertension is the commonest cause of bleeding in adults)
- Retrocolumellar vein is the commonest site of bleeding in children.
(Acute rhinitis is the commonest cause of bleeding in children.)

Little's area has the anastomosis of both external and internal carotid arteries. The area above the middle turbinate also has confluence of both carotid arteries. Little's area is situated at anteroinferior part of septum and has anastomosis of four arteries. This vascular plexus is called Kiesselbach's plexus and is formed by:

- 1) Septal branch of sphenopalatine artery, also known as artery of epistaxis.
(It carries maximum blood to nose).
- 2) Anterior ethmoidal artery.
(Branch of ophthalmic artery which is a branch of internal carotid artery).
- 3) Terminal branch of greater palatine artery.
- 4) Septal branch of superior labial artery.

**Little's area showing anastomosis**

Posterior ethmoidal artery- A branch of internal carotid artery does not take part in the anastomosis at the Little's area. Area of Woodruff is another common site of bleeding. It is venous plexus situated near the posterior end of inferior turbinate and can be visualized by the nasal endoscope.

Causes of Epistaxis :***(A) Causes in the Nose :***

- (1) Idiopathic*
- (2) Congenital - Telangiectasis of the Nose (Osler-Rendu disease)*
- (3) Traumatic - Physical, chemical, or thermal trauma*
- (4) Inflammatory -*
 - *Acute- acute rhinitis*
 - *Chronic : Chronic rhinitis-tuberculosis, syphilis, leprosy*
 - *Fungal : Rhinosporidiosis*
 - *Non-specific : Atrophic rhinitis*
- (5) Neoplastic*
 - *Benign : angioma, haemangioma, papilloma*
 - *Malignant : carcinoma nose*

(B) Causes near the Nose :

- (1) Nasopharynx- Adenoid, juvenile nasopharyngeal angiofibroma, nasopharyngeal carcinoma.*
- (2) Sinuses- carcinoma of maxillary sinus, papilloma, antrochoanal polyp.*

(C) Causes away from the Nose : Systemic causes -

- (1) Congenital : haemophilia*
- (2) Infective : influenza*
- (3) Neoplastic : leukemia, Hodgkin's disease*
- (4) Blood dyscrasias : purpura, multiple myeloma*
- (5) Circulatory : hypertension*
- (6) Deficiency disease- liver disease, renal failure, Vit K & Vit C deficiency.*
- (7) Drugs : aspirin, anticoagulants.*
- (8) Miscellaneous : high pressure and high altitude, vicarious menstruation (i.e. epistaxis during menstruation)*

Management of Epistaxis :

- *Pressure on nose by pinching the nose. If not controlled -*
- *Anterior nasal packing. If not controlled -*
- *Posterior nasal packing along with anterior nasal packing. If not controlled -*
- *Ligation of anterior ethmoidal artery via external ethmoidectomy approach, if bleeding at or above the middle meatus.*

- *Ligation of internal maxillary artery in pterygopalatine fossa via Caldwell-luc operation.*
- *Ligation of external carotid artery via neck incision if bleeding below the middle meatus. It is the last resort when all measures fail to control the epistaxis. (If bleeding is above the middle turbinate then internal carotid system is responsible otherwise external carotid system.)*

EXAMINATION OF NOSE

- I. External examination of nose
- II. Anterior rhinoscopy
- III. Posterior rhinoscopy
- IV. Examination of paranasal sinuses

I. External Examination of Nose

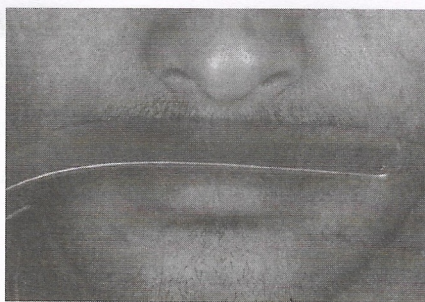
External deformities of the nose like external deviation of nose, nasal hump, depressed nasal bridge, nasal injury, congenital anomaly, any inflammation or swelling, benign conditions like rhinophyma are observed.

- **Depressed Nasal Bridge** : occurs in leprosy, syphilis or tuberculosis of nose and also in cretinism, thalassemia major.
- **Nasal Injury** : common after road vehicular accident.
- **Deviated Nose** : common in boxers.
- **Congenital Swelling** : glioma is present since birth.
- **Benign Condition** : Rhinophyma (Potato nose) is due to hypertrophy of sebaceous glands.
- **Broadening of Nose** : seen in antrochoanal polyp.
- **Frog Face Deformity** : seen in juvenile nasopharyngeal angiofibroma.
- **Crepitus** : felt in fracture nasal bone.

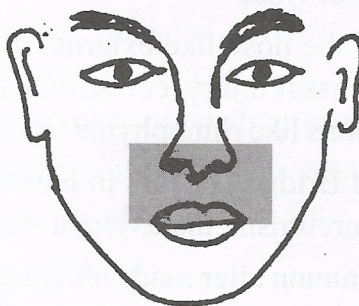
Cold Spatula Test :

Tongue depressor is kept about a cm. below the nostril and the amount of fogging on the spatula is observed. If fogging is less on one side, it indicates obstruction of that side of nasal cavity. In summers fogging is not appreciated so this test should be carried out in an air-conditioned room or after dipping the spatula in

cold water. The amount of fogging can also be measured on the graphic chromium plate.



Dangerous Area of Face : consists of the upper lip, lower end of septum and vestibule. It is called dangerous area of face as infection may traverse to angular vein to inferior ophthalmic vein and ultimately to cavernous sinus thrombosis due to the valveless nature of the connecting vein.



Dangerous area of face

Danger Area of Nose : is the olfactory area of nose. Olfactory nerve terminals have pia-arachnoid sheath while passing through the cribriform plate , so the subarachnoid space is in continuation with the nerve terminals. Any infection of this area may lead to meningitis, encephalitis etc.

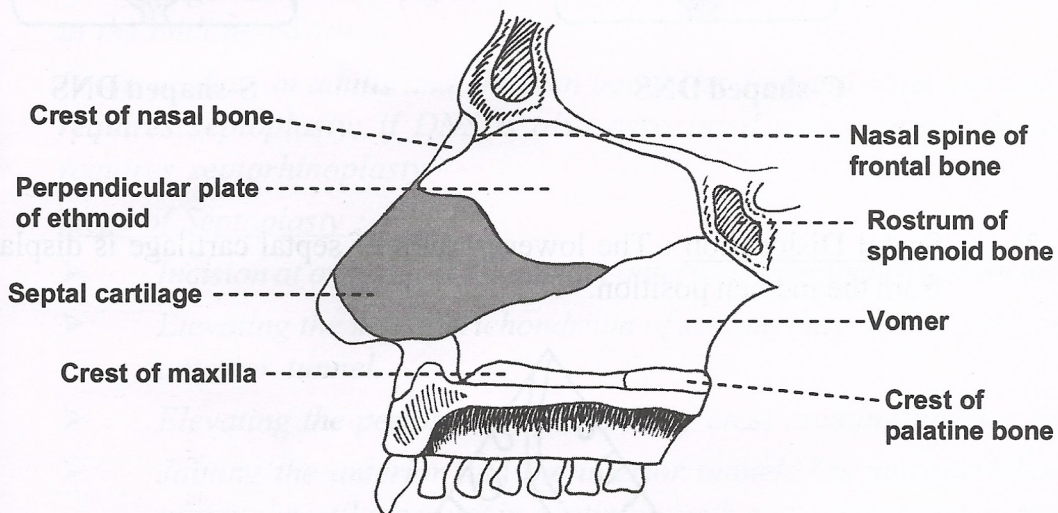
II. Anterior Rhinoscopy

The anterior rhinoscopy is carried out by Thudicum's nasal speculum. Vestibule is the area, which is covered by the blades of Thudicum's nasal speculum. Any vestibular lesion like furuncle is likely to be missed , so first raise the tip of nose by the thumb and examine the vestibule before using nasal speculum. Vestibule is stenosed in rhinoscleroma.

The structures visualized and examined on anterior rhinoscopy :

1. Nasal septum
2. Nasal cavity
3. Turbinates
4. Middle meatus
5. Colour of mucosa
6. Discharge
7. Crusts
8. Polyp
9. Mass
10. Bleeding
11. Pus
12. Maggots (if any)

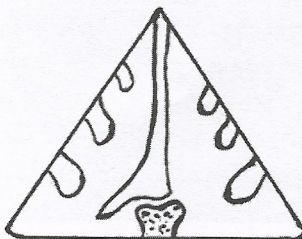
1. **Nasal Septum :** *Nasal septum is made-up of cartilage and bone. The cartilage forms the anterior portion of nasal septum, while bones like ethmoid (above) and vomer (below) forms the posterior portion of the nasal septum. Septal crest of maxilla and palatine bone form the inferior part.*



Medial wall of nasal septum

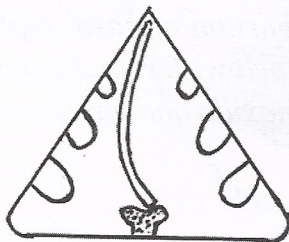
The septal deformity can be classified as :

- 1) Septal Spur : These are the sharp angulations, which occur at the junction of septal cartilage with the ethmoid or vomer bone.

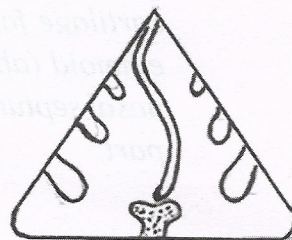


Septal spur

- 2) Septal Deviation : These are C shaped or S shaped. If anteroposterior axis is disproportionate, deviation is in the horizontal axis. If above -downward axis is disproportionate, deviation is in the vertical axis.

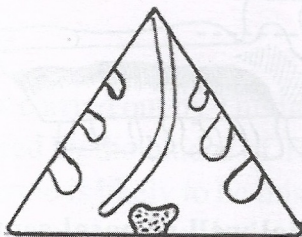


C-shaped DNS



S-shaped DNS

- 3) Septal Dislocation : The lower portion of septal cartilage is displaced from the median position.



Septal dislocation

Septal Perforation : A small septal perforation causes whistling sound during inspiration while a large septal perforation causes crusting of nose.

The common causes of septal perforation are -

- (1) After S.M.R. operation if tear occurs in mucoperichondrium on both sides at identical site
 - (2) Syphilis-causing bony septum perforation
 - (3) Tuberculosis - causing cartilaginous septum perforation
 - (4) Granulomatous disease of the nose
 - (5) Leprosy
 - (6) Idiopathic
- *snuff-taker's perforation-occur in tobacco or cocaine addiction when it is being taken as snuff.*
 - *Chromium perforation- found in chrome workers due to its acid fumes.*
 - *Pick ulcer perforation-occur due to picking off an ulcerated area.*

Septoplasty

Septoplasty is the surgery in which there is removal of only deviated portion of cartilage and preserving the rest of the cartilage, thus bringing the septum in the midline position.

It can be done in adults and children both. The deviated nasal septum (DNS) requires septoplasty; if DNS is also associated with external deviation it requires septorhinoplasty.

Steps of Septoplasty :

- *Incision at one side of the septum anteriorly(hemitransfixation incision).*
- *Elevating the mucoperichondrium of septum only on one side, creating anterior tunnel.*
- *Elevating the periosteum of maxillary crest creating inferior tunnel.*
- *Joining the anterior and the inferior tunnels (as mucoperichondrium of septal cartilage is not in continuity with mucoperiosteum of maxillary crest).*
- *Elevating the periosteum on both sides of ethmoid and vomer.*

- *Dislocating the septal cartilage from the ethmoid and vomer.*
- *Removal of deviated portion of ethmoid and vomer.*
- *Removal of inferior strip (approx. 3mm.) of septal cartilage.*
- *Removal of small part of most posterior portion of cartilage. (if required).*
- *Removal of bony spur inferiorly (if required).*
- *Closure of incision by suturing.*
- *Anterior nasal pack.*

SMR (Sub Mucous Resection of Septum)

In this surgery there is complete removal of septal cartilage and bone. The complications like septal perforation, saddling of nose, supratip depression, widening of nasal tip, retraction of the columella & flapping septum etc are very common. This surgery cannot be done in children. This is an obsolete surgery and there are very few true indications for this surgery like trans-septal hypophysectomy for the removal of pituitary tumour.

Difference between Septoplasty and S.M.R.

<i>SEPTOPLASTY</i>	<i>S.M.R.</i>
1. <i>It is a conservative surgery</i>	1. <i>It is a radical surgery</i>
2. <i>Only deviated portion of the septal cartilage is removed</i>	2. <i>The entire septal cartilage is removed</i>
3. <i>It can be done in children but very conservatively</i>	3. <i>It cannot be done in children</i>
4. <i>Flap i.e. septal perichondrium is elevated only on one side</i>	4. <i>Flap i.e. perichondrium flap is elevated on both sides</i>
5. <i>Complications like septal perforation, saddling of nose or flapping septum are uncommon</i>	5. <i>Septal perforation and saddling of nose or flapping septum are common</i>
6. <i>Revision surgery is possible</i>	6. <i>Revision surgery is not possible</i>

2. Nasal Cavity :

- *Roomy nasal cavity is seen in atrophic rhinitis.*
- *Greenish crusts are seen in atrophic rhinitis.*

Atrophic rhinitis : It is the condition in which nasal mucosa becomes atrophied. This condition is known as ozaena.

It is caused by *Coccobacillus*, *Bacillus mucosus*, *Coccobacillus foetidus* ozaena, *Klebsiella ozaenae* and diphtheroid bacilli. There is crust formation inside the nose and when these crusts are removed, epistaxis occurs. There is horrible stench (like bad smell of cadaver) from the patient's nose. Patient remains unaware of this problem because of anosmia. The problem with this condition is social boycott due to the bad smell.

The treatment consists of (1) 25% glucose in glycerine, (inhibits the proteolytic organisms), (2) alkaline nasal douching. The alkaline nasal solution consists of 30 gm sodium bicarbonate (known as edible soda), 30 gm of sodium baborate (known as Suhaga) and 60 gm of sodium chloride (edible salt). The patient should take one teaspoon of this mixture and dissolve in a glass of lukewarm water. The patient should do the nasal douching at least 2-3 times in a day with the help of syringe. The surgical treatment consists of modified Young's operation in which there is closure of nasal vestibule leaving 2 mm hole.)

3. Turbinates :

There are three turbinates. Superior turbinate, middle turbinate and inferior turbinate.

The inferior turbinate may be normal or engorged on one side or both sides. If DNS is on left side, there is a compensatory hypertrophy of inferior turbinate on the right side. The middle turbinate has normal medial convexity towards the septum. If it has convexity towards the lateral wall and concavity towards the septum, it is called paradoxically bent middle turbinate. Superior turbinate is not seen by Thudicum's nasal speculum, it can be seen only by the nasal endoscope. Inferior turbinate and septum are the areas of the nose, which have arterio-venous anastomosis.

4. Middle Meatus :

Look for any pus in the middle meatus. Pus in the middle meatus means suppuration of ethmoid or maxillary sinus. If osteomeatal complex is crowded, it calls for the FESS (functional endoscopic sinus surgery). Bulla ethmoidalis may be seen in anterior rhinoscopy.

(Bulla ethmoidalis is large ethmoidal air cell. It is an important surgical landmark during the FESS as posterior to that is ground lamella which separates the middle ethmoidal cells with posterior ethmoidal cells.)

5. Colour of Mucosa :

- Normal nasal mucosa is pinkish red.
- Red congested mucosa is seen in acute rhinitis.
- Pale oedematous mucosa is seen in allergy.
- Pinkish white mucosa is seen in anaemia and tuberculosis.

Wherever there is pale mucosa, think of -

(1) Anaemia , (2) Allergy , (3) Tuberculosis.

6. Discharge :

- Watery discharge is seen in allergic rhinitis.
- Clear fluid discharge is found in CSF rhinorrhoea.

To differentiate the nasal discharge with CSF rhinorrhoea, either collect the discharge in test tube and get CSF examination done or simply ask patient to clean the discharge in handkerchief and allow it to dry, CSF discharge does not stiff the handkerchief but nasal discharge becomes stiff on drying due to its mucus content. This test is known as handkerchief test. CSF rhinorrhoea if it is blood stained, produces 'halo effect' on white bedclothes on drying. Nasal discharge has none of these properties. Further confirmation is obtained by injection of fluorescein or radioactive isotope into the CSF via a lumbar puncture. High resolution CT scanning localizes the fracture site. The treatment consists of nasal endoscopic repair of dura or by craniotomy. The avoidance of meningitis is mandatory in these patients.

Method for Collecting CSF for Biochemical Analysis :

Keep the patient in supine position for some time. Then patient is brought to an upright position with the neck flexed. A sudden rush of clear fluid is indicative of CSF fistula.

- Mucoïd discharge is seen in antrochoanal polyp.
- Mucopurulent or purulent discharge is seen in chronic maxillary sinusitis.
- Blood stained discharge is seen in inverted papilloma or in underlying malignancy.
- Foul smelling unilateral nasal discharge in children is almost diagnostic of foreign body in the nose unless until proved otherwise.

7. Crust :

Foul smelling crusts are seen in atrophic rhinitis. In summer season, crusting

occurs in the nasal cavity and the crusts are felt by the patient due to the hot weather. Instillation of normal saline drops brings relief in this situation.

8. Polyps :

Polyps are oedematous mucus membrane (They are not new growth). The nasal polyps are either ethmoidal polyps or antrochoanal polyps.

Differences between Ethmoidal Polyp and Antrochoanal Polyp

		<i>Ethmoidal polyp</i>	<i>Antrochoanal polyp (Killians polyps)</i>
1.	<i>Cause</i>	<i>Allergic</i>	<i>Infective</i>
2.	<i>Origin</i>	<i>Ethmoidal labyrinth</i>	<i>Maxillary antrum</i>
3.	<i>Age Group</i>	<i>Common in adults</i>	<i>Common in children</i>
4.	<i>Number</i>	<i>Multiple</i>	<i>Single</i>
5.	<i>Colour</i>	<i>Bluish</i>	<i>Grey white</i>
6.	<i>Grows</i>	<i>Anteriorly</i>	<i>Posteriorly</i>
7.	<i>Nasal Obstruction</i>	<i>Bilateral</i>	<i>Unilateral when polyp is in the nasal cavity. When it reaches nasopharynx causes bilateral nasal obstruction.</i>
8.	<i>Removal</i>	<i>FESS & opening of ethmoidal labyrinth & removal of polyp</i>	<i>FESS & removal of polyp & widening of maxillary ostium</i>
9.	<i>Recurrence</i>	<i>Common</i>	<i>Not common</i>

Septal haemangioma is also known as bleeding polyp of nose. Engorged inferior turbinate is commonly mistaken as polyp.

The differences between engorged inferior turbinate and polyp are :

- Polyp can be probed around and inferior turbinate not.
- Polyp yields on pressure while inferior turbinate does not.
- Polyp is soft to touch and inferior turbinate is firm to touch.
- Polyp is relatively insensitive to touch, inferior turbinate is sensitive to touch.

Nasal Endoscopes

Nasal endoscopes have done revolution in the nasal surgery. The different types of nasal endoscopes are (adult and paediatric) - 0°, 30°, 45°, 70° and 90°.

The surgeries performed are :

FESS (Functional Endoscopic Sinus Surgery), DCR (Dacryocystorhinostomy), hypophysectomy for the pituitary gland tumour, optic nerve decompression in sphenoid sinus, CSF fistula repair.

FESS (Functional Endoscopic Sinus Surgery)

Procedure : After packing nose with 4% xylocaine and adrenaline, the uncinate process is removed. This process is called uncinectomy. There after the infundibulum is opened (infundibulotomy). All the ethmoidal cells are removed right upto the roof, laterally upto the lamina papyracea. Bulla ethmoidalis is the most constant ethmoid cell, and along with its surrounding cells constitute the anterior ethmoidal cell. If any ethmoidal polyps are present, they are also removed. The posterior limit of these ethmoidal cells is the ground lamella. Posterior to that is posterior ethmoidal cells and further posteriorly is the sphenoid sinus. The agger nasi cells are also removed to visualize the nasofrontal duct. The opening of maxillary antrum is identified and it is widened by the Ostrum's backward cutting forceps.

Stankiewicz Sign : Pressure on eyeball causes the movement of periorbital fat and it is warning for the surgeon to stop the dissection immediately. This problem occurs in extensive ethmoidal polyposis when surgeon accidentally removes the lamina papyracea and enters the orbit with the prolapse of orbital fat. A useful guide to differentiate polyp from fat is that removed polyp sinks in saline while fat floats.

Complications : Bleeding, specially if anterior or posterior ethmoidal artery is damaged, C.S.F. leak if dura is breached, injury to eye (ecchymoses) if lamina papyracea is damaged, epiphora if damage to nasolacrimal duct by excessive removal of bone anteriorly by Ostrum's backward cutting forcep and synechiae.

9. Mass :

It could be benign or malignant.

- Benign mass can be juvenile nasopharyngeal angiofibroma (JNAF).
- Malignant mass could be arising from nose, sinuses or from nasopharynx.
- Inverted papilloma (Ringertz's tumour) arises from the lateral wall of nose. It is associated with squamous cell carcinoma in 10-15% of cases. It is called inverted, as there is inward growth of epithelium.

10. Bleeding :

Observe any frank blood or clotted blood in the nasal cavity. Quite often ulceration with clotted blood is seen in the Little's area in hypertensive patients.

Epistaxis Digitorium (bleeding by nose picking) is another common cause of bleeding in children and adults especially in summers. Ulcerations are also seen on septum and inferior turbinate. The change of nose picking habit and trimming of nails is required.

11. Pus :

When pus is seen to flow from the middle meatus, it suggests the suppuration of anterior group of sinuses. When pus is seen in the olfactory cleft (a slit between middle turbinate and septum) it signifies suppuration of posterior group of sinuses.

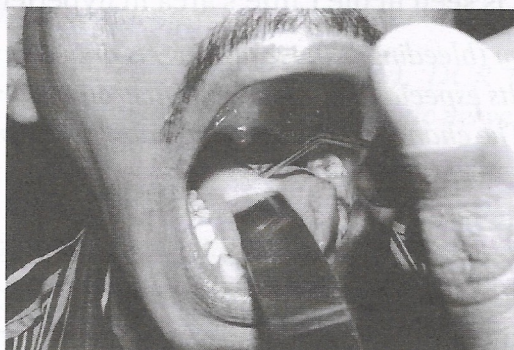
12. Maggots :

Maggots are larval stage of fly (genus chrysomia). Maggots occur in the nose in atrophic rhinitis. Patient's nasal mucosa in atrophic rhinitis is relatively insensitive and there is also associated anosmia. Fly lay their eggs inside the nose leading to the maggots inside the nose. They are removed by forceps by anterior rhinoscopy. The removed maggots should be kept in the boiling water so they die immediately otherwise they start crawling everywhere. Patient should instil liquid paraffin in the nose so that all the maggots die because of suffocation. The patient is advised to use mosquito net in the night while sleeping to prevent further laying of eggs by the fly. The maggots inside the nose if not removed may cause meningitis.

III. Posterior Rhinoscopy**Method :**

Take posterior rhinoscopy mirror, warm the mirror side over the spirit lamp or dip the mirror in hot water to prevent fogging. (Fogging can also be prevented by dipping the mirror in savlon solution or rubbing a dry soap on mirror or if nothing is available, rubbing the mirror against the mucosal surface of cheek.) It should not be too hot and should be checked by touching the metallic side of mirror on the skin. Ask patient to breath through nose as it brings the soft palate forward, press the tongue with the tongue depressor and introduce the posterior rhinoscopy mirror gently without touching the posterior pharyngeal wall otherwise it will cause gag reflex. Examine all the structures systematically. If

the patient has a strong gag reflex or is very unco-operative, spray the throat and posterior pharyngeal wall with 4% or 10% xylocaine.



The structures visualized on posterior rhinoscopy are -

Posterior part of septum, both choanae, common meatus, roof and posterior wall of nasopharynx, opening of nasopharyngeal end of eustachian tube, fossa of Rosenmuller, adenoid in case of children, any nasopharyngeal pathology like juvenile nasopharyngeal angiofibroma, nasopharyngeal carcinoma, any cyst or antrochoanal polyp.

Juvenile Nasopharyngeal Angiofibroma : It originates from the posterior part of nasal cavity close to the superior margin of sphenopalatine foramen. It looks like red fleshy smooth mass occupying the nasopharynx. It is a benign tumour but locally malignant. It may spread to the (1) Nasal cavity causing : nasal obstruction, discharge and epistaxis, (2) Paranasal Sinuses : maxillary, ethmoid, and sphenoid sinus, (3) Infratemporal, pterygomaxillary fossa and cheek, (4) Orbit causing proptosis and frog face deformity, (5) Cranial cavity : middle cranial fossa and anterior cranial fossa. It spreads by expansion rather than invasion and it never gives rise to metastasis. It bleeds heavily as histologically tunica media is deficient so blood vessels do not contract. There may be some confusion to differentiate antrochoanal polyp occupying nasopharynx with angiofibroma. But x-ray nasopharynx lateral view will show air column in antrochoanal polyp but not in angiofibroma. MRI shows typical 'salt and pepper' appearance. Tumour is removed by transpalatal approach (Wilson's incision), lateral rhinotomy (Moure's incision), or degloving approach.

Hollman Miller Sign : posterior maxillary sinus wall compressed in angiofibroma in lateral view of maxillary sinus

(The tumours of ENT that spread by expansion rather than invasion are - Cholesteatoma, Juvenile nasopharyngeal angiofibroma, Inverted papilloma, and Glomus jugulare).

IV. Examination of Sinuses

- I. The **anterior group** of sinuses are - frontal sinus, anterior ethmoidal group of sinuses and maxillary sinus. They open in middle meatus anterior to posterior in that order.
- II. The **posterior group** of sinuses are - posterior ethmoidal group of cells and sphenoid sinus. Posterior ethmoidal cells open into the superior meatus while sphenoid sinus opens into the sphenoethmoidal recess.

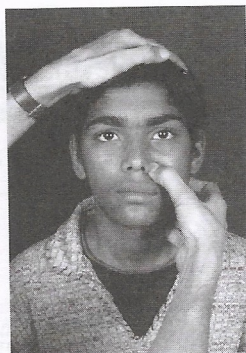
(Maxillary sinus is also known as antrum of Highmore. The discovery of antrum came as a result of a patient who after the tooth extraction thrust a silver bodkin into the empty socket and was exceedingly frightened to find it pass almost to her eyes. She followed this experiment with the passage of a small-stripped feather, which folded up inside the antrum. She was terrified to imagine that it had gone inside her brain and consulted her doctor, Mr. Nathaniel Highmore. That led to the discovery of antrum.)

Inspection

In acute sinusitis there may be swelling and redness of the skin overlying the maxillary sinuses.

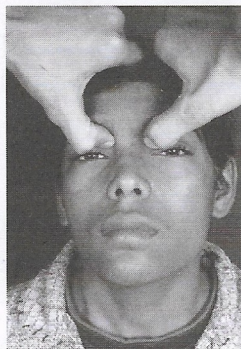
Palpation

- The tenderness of the maxillary sinuses is elicited by applying the firm pressure at the canine fossa.



- The tenderness of ethmoid sinuses are elicited by applying pressure at the lateral side of bridge of nose.

- The tenderness of frontal sinuses is elicited by applying pressure at the floor of frontal sinus, just above the orbit. One must take precaution not to press the supra orbital nerve otherwise it may cause false tenderness.



Sinusitis can be confirmed by taking x-ray paranasal sinuses (PNS). The different radiological views for the paranasal sinuses are :

Frontal Sinuses - occipitofrontal view or Caldwell's view.

Maxillary Sinus - occipitomental view or Water's view. This position is obtained either in the standing position or in the lying position with nose and chin in one plane.

The haziness of the sinuses should be compared with the orbit. The haziness of maxillary sinuses indicates sinusitis. The mucosal thickening is suggestive of allergic sinusitis. The fluid level indicates pus in the sinuses. The fluid level in the sinus remains the same on tilting the head. The earlier method of transillumination test of sinuses is obsolete. It is done by placing one torch in the midline inside the oral cavity and observing the infra-orbital crescents in the dark room. When there is pus in the maxillary antrum, or swollen mucous membrane or thickened bony wall, the infra-orbital crescent is absent. Since this test is not very reliable so it is no more used and CT scan gives more accurate information of sinuses.

Carcinoma of maxillary sinus

May present as nasal mass, epistaxis, palatal growth or even painless falling of teeth.

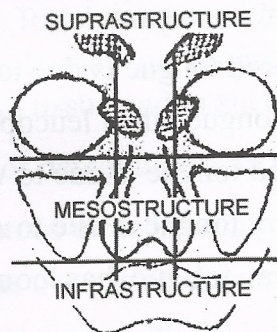
- Ohngren's classification : An imaginary line drawn from inner canthus to the angle of mandible thus dividing the maxillary antrum into the two halves - Anterior inferior and posterior superior. This classification was further modified by an imaginary vertical line drawn from the pupil dividing maxillary antrum into four quadrants.

- (1) *Anterior inferior medial - Least dangerous as away from the vital structures*
- (2) *Anterior inferior lateral*
- (3) *Posterior superior lateral*
- (4) *Posterior superior medial-most dangerous as close to cribriform plate and meninges.*



Ohngren's classification

- **Lederman's classification** : Lederman was one of the foremost head and neck radiotherapist. He described two horizontal lines, one drawn from the floor of orbit and another from the floor of antrum i.e. suprastructure, mesostructure and infrastructure and two vertical lines drawn from the inner canthus dividing the nose and sinuses into nine segments.



Lederman's classification

EXAMINATION OF ORAL CAVITY

HISTORY

In case of ulcer, ask about pain.

- Aphthous ulcers and dental ulcers are quite painful.
- Tuberculous ulcer is painful from the beginning.
- Malignant ulcers frequently cause referred pain in the ear.

Enquire about tobacco chewing, excessive smoking or drinking.

EXAMINATION

Inspection

(i) Tongue :

Ask patient to open the mouth and observe :

1. Volume : Massive tongue (macroglossia) is due to lymphangioma, neurofibromatosis and cretinism.
2. Colour :
 - Pallor is seen in anaemia.
 - White coloured tongue is due to leucoplakia.
 - Red glazed tongue when leucoplakia plaques are shed.
 - Blue coloured tongue is due to venous haemangioma.
 - Black or hairy tongue is due to *Aspergillus niger*.
 - Geographical tongue has convoluted pattern and is of no significance.
3. Cracks or Fissures : Congenital fissuring of tongue or scrotal tongue usually have transverse fissure and are of no pathological significance. Syphilis cracks are usually longitudinal.
4. Fur : Furring of tongue is of little value. It is found in heavy smokers and mouth breathers. A black hairy tongue is due to fungus infection and in immunocompromised patients. The strawberry tongue has enlarged papillae on bright red surface.

5. The Papillae :

- Bald Tongue - There is generalized atrophy of papillae and found in pernicious anaemia.
- Geographical Tongue - is harmless anomaly characterised by localized irregular red area of desquamated epithelium and filiform papillae. It is surrounded by white yellow border giving the appearance of map.

6. Tongue-tie : *It is congenitally short frenulum linguae in children (ankyloglossia).*

In complete ankyloglossia, child is unable to protrude the tongue beyond the incisor teeth. Partial ankyloglossia typically causes notching at the tip. If there is an articulatory speech disorder and a short frenulum, speech development may improve if the frenulum is cut.

The consonants of speech are associated with particular anatomical site -

- 'p' and 'b' are labials
- 't' and 'd' are dentals
- 'm' and 'n' are nasals.

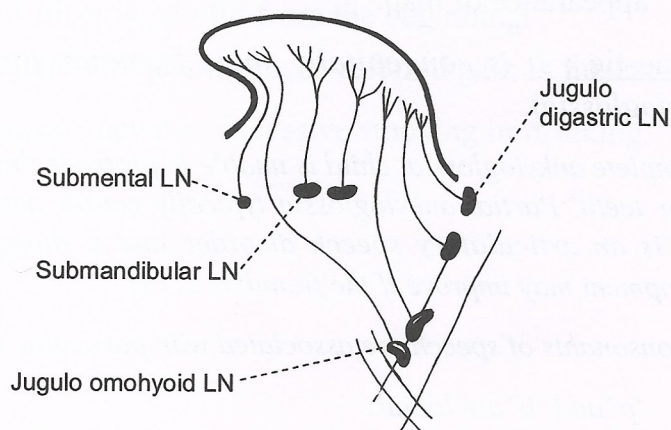
7. Swelling : If any swelling is present examine its site, size, shape, margin, colour like any other swelling mentioned earlier. Any cyst may also be present on tongue. Rarely angioma like tumour is seen in the region of foramen caecum. It may be lingual thyroid and may be the only functioning thyroid tissue and in such cases thyroid scan is mandatory.8. Ulcer : Aphthous or dental ulcers on tongue.

- Carcinomatous ulcer is usually on the margin of tongue.
- Gummatous ulcer is on the dorsum.
- Tuberculous ulcer is on the tip, side or dorsum.
- Dental ulcer is on the side of tongue where they come in contact with sharp teeth.

9. Mobility : Ask patient to protrude his tongue and move from side to side. Restricted mobility is seen in advanced carcinoma. In children short frenulum linguae may cause tongue-tie.

Lymphatic drainage of tongue :

- *Tip - submental and jugulo omohyoid lymph nodes.*
- *Margin - Submandibular and upper deep cervical lymph nodes.*
- *Back - Jugulodigastric and jugulo omohyoid lymph nodes. (Jugulo-omohyoid nodes also have drainage from the opposite side of tongue).*

**Lymphatic drainage of tongue**

Chronic Superficial Glossitis : Remember five 'S' as the aetiological factors :

1. Syphilis
2. Sepsis
3. Smoking
4. Spirit
5. Spices

There are 5 stages of chronic superficial glossitis -

- (1) Stage of hypertrophy
- (2) Stage of leucoplakia
- (3) Stage of 'red glazed tongue' when leucoplakia plaques are shed
- (4) Stage of crack and fissure (pre-cancerous stage)
- (5) Stage of carcinoma

Ulcers of Tongue :

- 1) Aphthous Ulcers : These are small painful ulcers. They have white / yellow floor surrounded by hyperemia. They may occur on lips or cheek. They are quite often associated with altered intestinal bacterial flora.
- 2) Dental Ulcers : These occur against sharp tooth or tooth plate. They are painful and indurated.
- 3) Tuberculous Ulcers : They are multiple and extremely painful ulcers, situated at margin, tip or dorsum. They have undermined edges and pale granulating floor.
- 4) Syphilitic Ulcer : It is painless and situated at the dorsum. It has punched out edges and wash-leather slough.
- 5) Carcinomatous Ulcer : It is painless to start and later on there is referred otalgia to ear. It has raised, rolled out margins and induration. Very soon lymph node involvement occurs.

The pre-cancerous conditions of the tongue are :

1. Chronic dental ulcer against the sharp tooth
2. Chronic superficial glossitis
3. Sessile papilloma
4. Syphilis
5. Plummer-Vinson syndrome

Clinical types of Carcinoma Tongue :

1. Fungative type
2. Ulcerative type
3. Cracked or fissured type
4. Nodular type
5. Frozen type where whole tongue is transformed into indurated mass.

The first two types are the most common varieties.

Sites of Carcinoma Tongue :

Lateral margin of anterior 2/3 of tongue - (commonest), followed by posterior 1/3 of tongue, tip, ventral surface, frenulum and dorsum of tongue.

(ii) Palate :

Examine for perforation, ulceration or swelling. If there is any congenital cleft palate, look for the extent whether involving uvula, soft palate or hard palate. Perforation of hard palate may be caused by any previous surgery done like transpalatine approach for juvenile nasopharyngeal angiofibroma or cleft palate repair. In all such cases scar mark of previous surgery is always present. Syphilis or Wegener's granuloma may also cause perforation of hard palate.

Examine for any soft palate paralysis. Ask the patient to say 'Ah'. The paralysed soft palate does not move. In unilateral paralysis palate is drawn to the healthy side on phonation, but when bilateral paralysis, the palate hangs loosely and does not respond to the stimulation.

The soft palate paralysis may occur due to -

viral infection (influenza), after diphtheria, poliomyelitis and occasionally after any vagus nerve pathology.

Rhinolalia Aperta : (*Rhinolalia means nasal voice, rhinolalia aperta means escape of air*).

When soft palate is paralysed, nasopharynx cannot be shut off from the rest of pharynx, resulting in escape of air. This condition is known as rhinolalia aperta. The soft palate paralysis also causes fluid and even solid to regurgitate through nose.

Rhinolalia Clausa occur in nasal blockage as commonly seen in acute rhinitis. The only speech sounds pronounced with an open nasopharynx are 'm', 'n', and 'ng', for all other sounds soft palate rises to close off the nasopharynx. Rhinolalia clausa affects certain consonants - 'm' becomes 'b', 'n' is changed to 'd' and 'ng' to 'g.' The speech is muffled and lacks the tone due to the absence of nasal resonance.

Sub-Mucous Fibrosis occurring due to 'Gutkha' (tobacco and lime) chewing. It is a pre malignant condition and causes extensive fibrosis and may cause inability to open the mouth. Although it is being treated by giving oral antioxidants, intra-oral injections of triamcinalone (steroid) and hyaluronidase, the prognosis is not very good. The physiotherapy in the form of mouth opening exercise is very useful.

The Pre-Malignant Conditions in E.N.T. : Inverted papilloma of sinus, solitary papilloma of larynx, leucoplakia, oral sub mucous fibrosis.

Trotter's Triad : It is seen in Nasopharyngeal carcinoma and consists of -

- (1) Ear discharge or conductive hearing loss due to eustachian tube obstruction
- (2) Facial pain (as mass spreads to the sinus of morgagni and involves 5th nerve)
- (3) Relative immobility of soft palate

(iii) Floor of Mouth :

Ask patient to open the mouth and to touch the palate with the tip of tongue. Examine the floor of mouth and the under surface of tongue. Ranula looks like unilateral bluish cyst. A plunging ranula may have cervical prolongation into the submandibular region. Sublingual dermoid is an opaque swelling exactly in the midline extending into the submental region. Any stone in the submandibular duct (Wharton's duct) near its opening on either side of frenulum linguae shows the obvious swelling.

(iv) Cheek :

Examine for any aphthous ulcer, leucoplakia, melanosis and mucosal hyperpigmentation, mucous cyst, papilloma, carcinoma or cheek nibbling. In acute parotitis, the opening of parotid duct (Stensen's duct) situated opposite to the upper second molar is congested.

Cheek Nibbling : Many patient habitually nibble their cheek. The buccal mucosa look white.

Leukoplakia : It is a white patch on the mucosal surface. Tobacco is the most common offending agent. Microscopically it shows parakeratosis, hyperkeratosis, acanthosis, dysplasia, carcinoma in situ or intraepithelial carcinoma.

Erythroplakia - it is red patch or plaque on the mucosal surface due to decreased keratinisation. The chances of developing carcinoma is very high.

(v) Retromolar Trigone :

Common site for carcinoma or oral submucous fibrosis.

(vi) Gum :

Gum hyperplasia occurs in poor oral hygiene, scurvy, phenytoin sodium therapy, and acute monocytic leukemia. Epulis is a general term used to describe any swelling arising in the gum.

(vii) Teeth :

Colour - Tarter deposition occurs in heavy smokers.

Shape - Peg shaped teeth (Hutchinsonian teeth) is seen in congenital syphilis.

Ridging - Transverse ridges in permanent teeth occur due to vitamin C and D deficiency in infancy.

Palpation :1. Tongue :

While palpating the tongue one must take precaution to keep the patient tongue inside the oral cavity as it causes relaxation of the tongue muscles. Protruded tongue causes contraction of the muscles and may give rise to the false impression of induration. Induration may be present at the base of gummatous ulcer but is absent in the tuberculous ulcer. The malignant ulcer bleeds during palpation. Palpate the back of the tongue for any ulcer or swelling. The lingual thyroid should not be mistaken for any growth. Also palpate for a sharp tooth against an ulcer of tongue.

2. Palate :

Any ulcer or cyst (nasopalveolar or nasopalatine cyst) is examined in the usual way. Alveolar abscess causes tender fluctuating swelling close to the alveolar process. Palate is often pushed downwards by the growth of maxillary antrum and nasopharyngeal angiofibroma. Rarely ectopic salivary gland may also cause swelling in the palate.

3. Floor of Mouth :

It should be palpated bimanually. Translucency is tested if there is any cystic swelling. Ranula is translucent but sublingual dermoid cyst is not translucent. The submandibular duct is palpated for any stone.

4. Cheek :

The mucus membrane and the cheek should be carefully palpated to know involvement of skin of cheek by malignant growth.

Nicotine Stomatitis :

In heavy smokers (more than a pack/day) the orifices of mucous glands in hard palate which are white dots in appearance becomes red. It is also known as "pipe-smoker's palate".

In cigarette smokers 75% of oral cancers develop in dependent drainage area of mouth as carcinogens have prolonged contact with mucosa which becomes devoid of protective keratin layer. The absorption by sebaceous gland underlying mucosa enhances chemical carcinogenesis.

The tonsillo-lingual sulcus lies between tonsil and the base of tongue is an important site for primary malignant growth & often overlooked. So it is also known as graveyard of the oral cavity.

Torus Palatinus :

It is single bony exostosis in the midline of the hard palate. It is due to embryologic malfusion and not a neoplasm.

Torus Mandibularis :

It is similar to Torus palatinus but bilaterally found on the lingual aspect of the mandible near the mid line. They are also asymptomatic.

Cyst of the Mouth :

1. Mucous Retention Cyst : *It may occur on lips and buccal mucosa. They appear as smooth rounded swelling containing fluid. The treatment is total removal of cyst.*
2. Ranula : *It is the retention cyst in the floor of mouth arising from submandibular or sublingual duct or from mucous glands in the floor of mouth.*

Nasopalatine Cyst :

It arises from tissue in the incisive canal and present on the palate or on the nasal floor.

Naso-alveolar Cyst (Nasolabial Cyst) :

It arises from the epithelial remnants of the naso-lacrimal apparatus. It occurs in the lateral half of the nasal floor anterior to the inferior turbinate. They enlarge and splay the nostril causing fullness of the upper lip.

Epstein Pearls :

It is mid-palatal cyst of infant.

EXAMINATION OF SALIVARY GLANDS

HISTORY

- A painless, slow growing swelling of parotid gland is suggestive of mixed parotid tumour. If it starts growing rapidly, it is suggestive of malignant transformation.
- A watery flow from the parotid gland on the skin surface during meals with the previous history of trauma or abscess is suggestive of parotid fistula.
- A swelling in the submandibular region with colicky pain at the time of meals is highly suggestive of stone in the submandibular duct. The swelling becomes tense and tender during the meals.

EXAMINATION

Inspection

(i) Swelling :

- Parotid swelling appears below, in front, and behind the lobule of ear causing usually lifting of the lobule. It also obliterates the normal fissure behind the ramus of mandible.
- Submandibular gland swelling is present in the submandibular triangle.

(ii) Duct :

The Stensen's duct (parotid duct) is seen on the buccal surface, opposite to the upper 2nd molar tooth. In suppurative parotitis, pus may come out of the duct on pressing the gland while in malignant growth, blood may come out. Ask patient to touch the palate by the tip of tongue, the opening of submandibular duct (Wharton's duct) on either side of frenulum linguae or sublingual duct (Bartholian's duct) is seen. It may be inflamed or swollen.

Stensen's duct was discovered by Niels Stensen, while dissecting sheep head he discovered a channel in the parotid gland through which he could pass his probe upto the teeth.

Wharton's duct was discovered by Thomas Wharton

(ii) Palpation

- The parotid duct may be palpated on the masseter muscle by rolling the finger across it while patient clinches the teeth by making the muscle taut. The terminal part of duct is palpated bidigitally between index finger in the mouth and thumb over the cheek.
- The submandibular gland and duct is palpated bidigitally. A finger is inserted inside the mouth along the groove between the alveolus and the tongue and pressed on the floor of mouth. The finger of the other hand is placed under the jaw. The gland and duct are palpated from behind. This bidigital palpation helps to differentiate it from the enlarged submandibular lymph node. The finger inside the mouth can feel the deeper part of salivary gland but not the lymph node (as salivary gland is situated above the mylohyoid muscle while lymph node is situated below the muscle.)

Saliva Flow Test : Test the flow of saliva by asking the patient to suck lemon. In absence of any stone or obstruction in the duct, saliva flows freely from the duct. If duct is obstructed by the stone, the salivary outflow is markedly obstructed and there is obvious swelling of the gland.

The stone formation is more common in submandibular gland and duct (50 times more as compared to parotid gland), as the secretion of submandibular gland is more mucoid, rich in calcium and more alkaline in pH. The tract of submandibular duct is narrow, more tortuous and opens in the floor of mouth vertically with anti-gravity.

The salivary calculus is radio opaque as it is composed of calcium and magnesium phosphates. If the calcium content is low, it may not be radio opaque.

Parotid Tumours :

- *Benign - Papillary cyst adenoma lymphomatosum i.e. Warthin's tumour or mixed parotid tumour (commonest)*
(It is called mixed as there are both cartilage and epithelial cells in it).
- *Malignant - Adenocarcinoma*

EXAMINATION OF TONSIL AND PHARYNX

TONSIL

Ask patient to open the mouth and Lack's tongue depressor is introduced to press the tongue. The tongue depressor should never press the posterior part of tongue as this causes gag reflex (due to the glossopharyngeal nerve). Examine the tonsil for its size, crypts, anterior pillar and posterior pillar.

Tonsillitis can be acute or chronic :

Acute Tonsillitis :

- Acute Follicular Type : There is acute inflammation of crypts and exudation from the crypts marks the reddened surface with white or yellow spots.
- Acute Parenchymatous Type : There is inflammation of whole tonsil.
- Acute Membranous Type : Another variant of follicular tonsillitis in which exudation from the crypts may coalesce to form the confluent membrane over the tonsil. It should be differentiated from diphtheric tonsillitis, in which membrane bleeds on removal. (while membranous tonsillitis does not bleed.)

The complications of acute tonsillitis are :

1. Chronic tonsillitis
2. Quinsy (Peritonsillar abscess)
3. Parapharyngeal abscess
4. Suppurative cervical adenitis
5. Acute otitis media
6. Systemic complications are -rheumatic fever, acute glomerulonephritis, chorea, subacute bacterial endocarditis.

Chronic Tonsillitis :

It is the complication of acute tonsillitis. It can be chronic follicular or chronic parenchymatous tonsillitis.

Chronic Fibroid Tonsillitis : It is the condition where tonsils are buried between the pillars. They are innocent looking, though they are not as repeated inflammation causes more fibrosis and reduction in size. It tends to bleed more during tonsillectomy.

Cardinal Signs of chronic tonsillitis are -

- (1) Flushing of anterior pillar
 - (2) On pressing the anterior pillar, cheesy material comes out of tonsil
 - (3) Enlarged tender jugulodigastric lymph node, when there is no other reason for it
- Out of these 3 signs, if 2 signs are present it is suggestive of chronic tonsillitis.

Complications of chronic tonsillitis are -

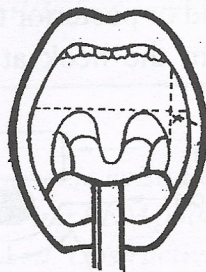
1. Quinsy : (Peritonsillar abscess, paratonsillar abscess) Infection in the tonsil involving large crypt (crypta magna or intra-tonsillar cleft) in the upper pole may spread through capsule into the peritonsillar space
(Peritonsillar space is the potential space between the tonsil bed i.e. superior constrictor muscle and the capsule) Here pus may quickly form giving rise to peritonsillar abscess.

Site of Abscess :

- a) In 90% of cases accumulation of pus is antero superior to the tonsil, so it lies behind the anterior pillar.
- b) Pus may also form lateral to the tonsil or posteriorly in relation to the posterior pillar and the lower pole.

Treatment : Incision & drainage and the site of incision is -

- a) The most prominent part. If it is not identified then -
- b) Half-way between the base of uvula and upper third molar tooth.
- c) Vertical line drawn upwards from the anterior pillar and horizontal line drawn lateral to uvula, the point where these two imaginary lines meet, incision is given outside of it. (Abscess tonsillectomy has also been described but not practised as bleeding is more during acute infective stage.)



Site for incision

Site for incision of left peritonsillar abscess

The embryonic importance of intra-tonsillar cleft is that it represents the unobliterated part of 2nd pharyngeal pouch. The pathological importance is that infection for quinsy starts from here.

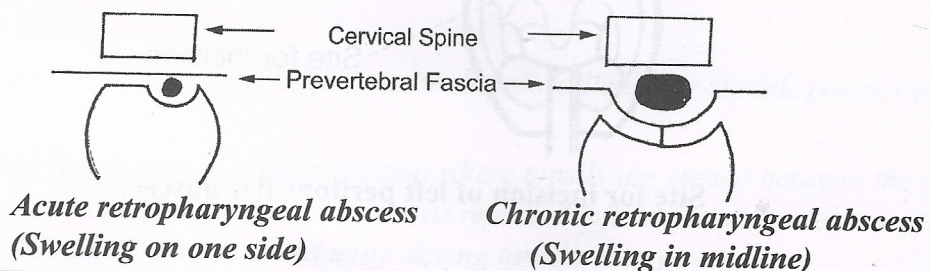
Quinsy is the Greek word meaning dog rattle. Although the cause of death of first U.S. president George Washington was written as quinsy in his death certificate but controversy surrounds it as he died probably because of acute epiglottitis or croup syndrome and not of quinsy.

2. Parapharyngeal Abscess : Pus is formed between superior constrictor muscle and investing layer of deep cervical fascia.
3. Intra-Tonsillar Abscess : There is communication between the enlarged crypts causing collection of pus and there is constant trickling of pus from the surface.
4. Tonsillolith : It is the deposition of calcium and magnesium carbonates and phosphates in the tonsil crypts.
5. Tonsillar Cyst : Debris accumulating in the tonsil crypts may be sealed off by fibrous occlusion of surface opening. These cysts are multiple, small and often symptomless. The large cyst may cause discomfort due to its tension. If simple incision does not help, tonsillectomy is advised.

POSTERIOR PHARYNGEAL WALL

Examine any bulging at posterior pharyngeal wall.

- Bulging only on one side of midline especially in children is suggestive of acute retropharyngeal abscess. There is throaty cry resembling quack of duck. The abscess is drained through oral cavity as it is in the true retropharyngeal space i.e. space between the prevertebral fascia and buccopharyngeal fascia. This space is also known as space of Gilette.
- Smooth bulging of posterior pharyngeal wall in the midline involving both sides of midline is seen in chronic pharyngeal abscess which is due to caries of the cervical spine. This abscess is behind or posterior to the prevertebral fascia or space of Gilette. It is drained from the neck at the anterior border of sternomastoid.



Postnasal drip in children is due to adenoid infection while in adults it is suggestive of sinusitis. The red granulations at the posterior pharyngeal wall commonly called as granular pharyngitis is usually of allergic type and is common in those who work in dry dusty atmosphere or in chronic smokers.

ENLARGEMENT OF ADENOID :

Clinical Features :

(1) Postnasal or anterior nasal discharge, (2) Nocturnal cough, (3) Headache, (4) Noisy respiration and wet bubbly nose.

Complications :

(1) Recurrent acute otitis media, (2) Chronic maxillary sinusitis, (3) Retention cyst of adenoid, (4) Mental lethargy, (5) Impaired speech, (6) High arch palate.

Treatment :

- Medical : Antibiotics, antihistamines and nasal decongestant.
- Breathing Exercise : Breathing through nose while keeping the mouth closed. Ask child to keep a piece of paper in between the lips with instruction not to drop the paper while taking respiration through nose.
- Surgical : Adenoidectomy.

Adenoid Facies (in chronic enlargement of adenoids) : The characteristics of adenoid facies are- pinched nose, open mouth, high arch palate, and crowded and protruding teeth.

Differences between tonsil and adenoid

Tonsil	Adenoid
1. Paired	1. Single
2. Multiple crypts are present	2. Crypts are not present, but furrows are present
3. It is bounded by capsule	3. Not bounded by capsule
4. It is covered by stratified squamous epithelium	4. It is covered by columnar ciliated epithelium

Sleep Apnoea :

It is defined as at least 30 apnoeic episodes each lasting 10 seconds or more during sleep. It usually occurs in snorers during REM phase of sleep. There are three forms of sleep apnoea central, obstructive and mixed. Obstructive sleep apnoea is the commonest variety in which there is partial obstruction or narrowing of upper airway due to hypertrophic tonsils and adenoid, deviated nasal septum, long soft palate, long uvula, large tongue, obesity etc. Consumption of alcohol in large quantities and excessive smoking may promote snoring.

EXAMINATION OF LARYNX

EXTERNAL EXAMINATION

Observe the Adam's apple. It is about 90° in men and about 120° in women. An advanced laryngeal carcinoma may distort the shape of Adam's apple.

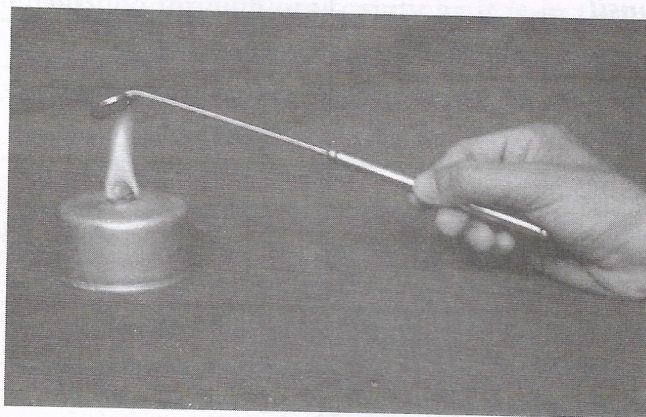
Laryngeal Crepitus

Move the larynx from side to side. A crepitus sound is felt. It is a normal sound produced by the movement of laryngeal cartilage against the cervical spine but absence of this sound (Boaca's sign) may be due to the possibility of growth between the laryngeal framework and the cervical spine (postericoid carcinoma).

INTERNAL EXAMINATION

Indirect Laryngoscopy

First explain the whole procedure to the patient. Warm the mirror side of indirect laryngoscopy mirror, tested on the examiner's hand for heat and hold it like a pen with right hand. Alternately mirror can be dipped in the solution of savlon or rubbed against the buccal mucosa to prevent the fogging.

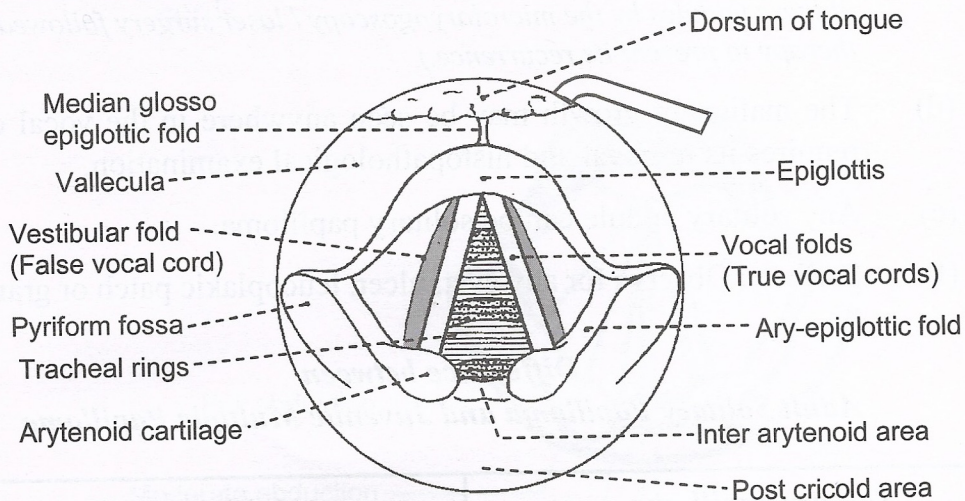


Ask the patient to open the mouth, protrude his tongue. The anterior part of tongue is grasped by the left hand. Ask patient to breathe gently through the mouth and place the warm indirect laryngoscopy mirror inside the throat gently against the anterior surface of uvula.

The structures seen on indirect laryngoscopy are :

- Anterior part of larynx-epiglottis and anterior commissure (seen towards the top of the mirror).
- Posterior part of the larynx - the arytenoids and the posterior commissure (seen at the lower portion of the mirror).

The patient's right vocal cord is seen on the left side of the mirror as the examiner looks at it. First examine the vallecula and the tip of epiglottis and then the ary-epiglottic fold and the pyriform fossa on each side. Then postcricoid region, arytenoids, false cords (ventricular folds) and vocal cords (vocal folds) are inspected. Sometimes it is possible to see upper few cms. of trachea. Finally movement of vocal cords are studied by asking patient to phonate 'ee' and breathe gently alternately several times. Also examine the colour of mucosa all around.



Laryngeal image seen on indirect laryngoscopy

The following things are examined :

(i) Epiglottis :

- The normal colour of epiglottis is pinkish.
- Bright red, swollen epiglottis is seen in acute laryngitis. X-ray neck lateral view shows thumb sign.
- Pale, swollen epiglottis is seen in allergic laryngitis.

- Turban shaped epiglottis is seen in tuberculosis of the larynx.

(ii) Vocal Cords

- (a) Colour : The normal vocal cords are pearly white in colour. In acute laryngitis they are congested.
- (b) Oedema : Oedema of vocal cords is seen in Reinke's oedema (it is oedema of the Reinke's space of the vocal cords).
- (c) Edge : Vocal nodules (Singer's nodules) are seen at the junction of anterior 1/3rd and posterior 2/3rd of the vocal cords.

(Vocal nodules are bilateral symmetrical nodules at the junction of anterior 1/3rd and posterior 2/3rd of the vocal cords. They occur due to voice abuse as the maximum strain occurs at this part of vocal cord. The treatment is removal of these nodules by the microlaryngoscopy / laser surgery followed by speech therapy to prevent its recurrence.)

- (d) The malignant growth may be seen anywhere in the vocal cords and requires its removal and histopathological examination.
- (e) Any solitary nodule can be solitary papilloma.
- (f) Surface : Observe for any cyst, ulcer, leucoplakic patch or granulations.

Difference between Adult Solitary Papilloma and Juvenile Multiple Papilloma

<i>Solitary papilloma</i>	<i>Multiple papilloma</i>
1. Occurs in adults	1. Occurs in children
2. Arises from the free edge of the vocal cords	2. Can arise from any part of the glottis.
3. Looks solitary in appearance	3. Looks like grape
4. No viral aetiology	4. Viral aetiology
5. Does not recur after removal	5. Recurrence is very common
6. They are pre-malignant and may undergo malignant degeneration, long term follow up is necessary.	6. They are not pre-malignant and does not undergo malignant degeneration.

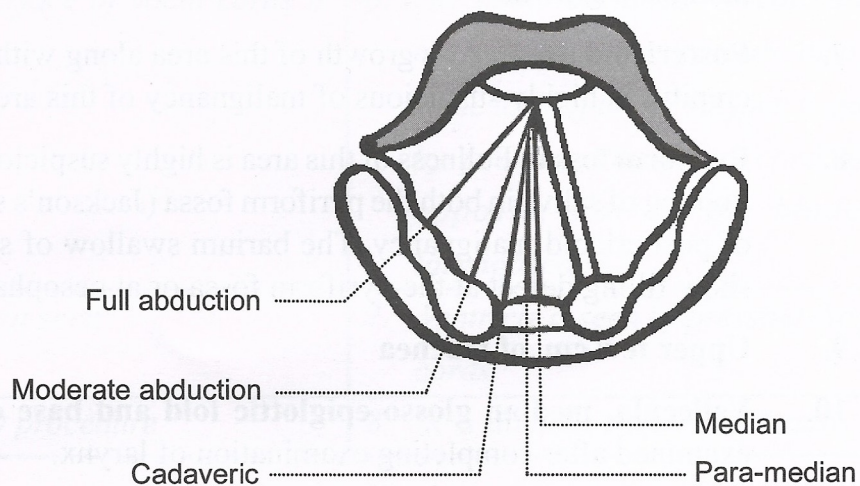
(g) Movement : The movements of vocal cords are examined at :

- gentle breathing
- during phonation
- forced inspiration
- on coughing
- at rest

The movement of vocal cord is restricted in abductor or adductor paresis, in infiltration by growth or in arthritis of crico-arytenoid joint.

(h) Vascular Tumour : Haemangioma.

(i) Position of Vocal Cords : There are different positions of vocal cords.



Positions of vocal cords

- 1) Median position : when vocal cords are in the midline during phonation.
- 2) Paramedian position : when vocal cords are 1.5 mm. away from the midline. This position is in strong whisper.

- 3) Cadaveric position : 3.5 mm. away from the mid line (This is the position of vocal cords after death that's why it is called cadaveric position). It occurs in complete vocal cord paralysis i.e. vagus nerve paralysis.
- 4) Gentle abduction : when vocal cord is 7 mm. away from the midline. This position is in quiet respiration.
- 5) Full Abduction : When vocal cord is 9.5 mm. away from the midline. This position is in deep inspiration.

3. **Arytenoids**

4. **Ary-epiglottic folds**

5. **Inter-arytenoids area** : Congestion of this area occurs in tuberculosis of the larynx.

6. **Glottic chink** : Glottic chink is reduced in vocal cord paralysis or any malignant growth.

7. **Postcricoid area** : Any growth of this area along with absent laryngeal crepitus is highly suspicious of malignancy of this area.

8. **Pyriform fossa** : Fullness of this area is highly suspicious of malignancy. Pooling of saliva in both the pyriform fossa (Jackson's sign) is suspicious of post cricoid malignancy. The barium swallow of such patients may show filling defect at the pyriform fossa or at oesophagus.

9. **Upper few cm. of trachea**

10. **Vallecula, median glosso epiglottic fold and base of tongue** is also examined after completing examination of larynx.

Beginner's Most Common Mistakes :

1. Fails to explain what he intends to do before he does it.
2. Fails to position the patient perfectly.
3. Fails to focus light properly on mirror.
4. Fails to elevate uvula with back of mirror.
5. Fails to insist on prolonged high pitched e-ee.

**Difference between
Indirect Laryngoscopy and Direct Laryngoscopy**

<i>Indirect laryngoscopy</i>	<i>Direct laryngoscopy</i>
1. There is foreshortening in A.P. diameter	1. There is no foreshortening
2. True and false cords appear to be in contact with each other	2. True and false cords are separated by ventricle
3. Inverted mirror image is seen	3. There is no inverted image (infact direct visualisation of the structures)
4. Vocal cords look flat and white with sharp free margin	4. Vocal cords are slightly rounded and faintly pink in colour
5. The movement of vocal cords is seen better	5. Movement is seen only in local anaesthesia
6. The under surface of vocal cords is not seen.	6. The under surface of vocal cords is not seen in this procedure also, but some idea of under surface is gained by pressing the vocal cord of the opposite side by the blades of laryngoscope
7. Ventricle is not seen	7. Ventricle is seen by pressing the false cords
8. It is an OPD procedure	8. It is done in operation theatre

VOCAL CORD PARALYSIS

The vocal cord paralysis may be unilateral or bilateral and complete or incomplete. Thus it can have 4 possible combinations :

- (a) Unilateral incomplete paralysis
- (b) Unilateral complete paralysis
- (c) Bilateral incomplete paralysis
- (d) Bilateral complete paralysis

Each presents different clinical picture and requires different management.

Pathology : All the muscles of larynx are supplied by recurrent laryngeal nerve except cricothyroid, which is supplied by external branch of superior laryngeal nerve. Cricothyroid is also partial adductor of the vocal cord. So any lesion involving only the recurrent laryngeal nerve will bring the cord in the paramedian position because of adduction action of cricothyroid. But any lesion involving vagus nerve (recurrent as well as superior laryngeal nerve) will bring the cord in cadaveric position.

Semon's Law : In all progressive organic lesions of motor laryngeal nerve, the abductors of the vocal cords are paralysed much earlier than adductors. The reasons for abductors to be paralysed earlier are :

- Adductors are first to develop so last to go.
- Bulk of abductor muscle is less.
- Chronaxy (response to the electric stimulation) is more in abductors.

Exception of Semon's Law :

- (1) Tuberculosis of the larynx where cricothyroid (partial adductor) is first muscle to get involved causing bowing of vocal cords.
- (2) Malignancy

Sir Felix Semon was laryngologist so he was allowed to operate inside the throat and was specifically forbidden ever to make external incision. He found it increasingly frustrating to refer the cases to surgeon who did not accept his plan of management. He kept fully trained surgical assistants when he operated. He pursued research in the innervations of larynx resulting in Semon's law.

The Causes of Left Recurrent Laryngeal Nerve Paralysis :

- (1) Carcinoma of the bronchus (2) Carcinoma of the oesophagus (3) Carcinoma of the thyroid gland (4) Thyroid surgery or radical neck dissection (5) Mediastinal lymphadenopathy, Hodgkin's disease (6) Enlargement of left atrium in mitral stenosis (7) Peripheral neuritis (8) Aortic aneurysm (9) Accidental trauma (10) Idiopathic.

The Causes of Right Recurrent Laryngeal Nerve Paralysis :

- (1) Carcinoma of the thyroid gland (2) Thyroid surgery (3) Carcinoma of the cervical oesophagus (4) Carcinoma of the apex of the right lung (5) Peripheral neuritis (6) Tuberculosis of right cervical pleura (7) Idiopathic.

The Causes of Vagus Nerve Paralysis

(1) Glomus jugulare tumour (2) Nasopharyngeal carcinoma (3) Bulbar paralysis (4) Peripheral neuritis due to influenza, herpes (5) Accidental high neck injuries or radical neck dissection (6) Metastatic glandular enlargement (7) Basal meningitis (8) Vagal tumours-glomus vagale (9) Idiopathic.

Unilateral Complete Paralysis (Unilateral Adductor Paralysis) :

In this condition both the recurrent and the superior laryngeal nerves are paralysed so the cord will be in cadaveric position. The patient will be practically aphonic at the onset of paralysis. In a week or two, the opposite cord will cross the midline on phonation and the voice will begin to return. The mucosa of normal cord becomes lax which helps in the closure of gap. Later on, paralysed cord falls downwards and forwards due to the weight of arytenoids and fibrosis. Now the voice is being produced by the two different levels of vocal cords i.e. the upper portion of paralysed cord meets the lower portion of the normal cord, and quality of voice is harsh, warbling and breathy- called diplophonia. It is almost impossible for the normal cord to meet paralysed cord lying in the cadaveric position especially posteriorly, so normal voice does not return unless surgery like thyroplasty, injection of Teflon by Bruning's syringe, or crico-arytenoid arthrodesis is being done.

Bilateral Complete Paralysis (Bilateral Adductor Paralysis) :

It is very uncommon condition and both the paralysed vocal cords are in the cadaveric position. Patient has aphonia and it does not recover. Patient can not develop a positive subglottic pressure and can not have co-ordinated swallowing so all the patients sooner or later develop bronchopneumonia and require tracheostomy.

Unilateral Incomplete Paralysis (Unilateral Abductor Paralysis) :

The vocal cord is fixed in the paramedian position due to bronchial carcinoma at left hilum.

Bilateral Incomplete Paralysis (Bilateral Abductor Paralysis) :

Both the vocal cords are in the paramedian position and sooner or later every patient will have stridor.

Functional aphonia :

The symptom is unable to phonate. It is always functional. But if patient is asked to cough, produces good quality cough which confirms the mobility of vocal cords. It needs psychiatric treatment.

The vocal cords can be paralysed or fixed -

- (a) paralysed due to recurrent, superior laryngeal nerve or vagus nerve paralysis.
- (b) fixed due to malignancy or crico-arytenoid joint arthritis.

Difference between Paralysed Cord and Fixed Cord

Paralysed Cord	Fixed Cord
1. There is no bowing of cords	1. There is slight bowing of the cord
2. Cord looks toneless	2. Cord looks shortened
3. There is some flickering of vocal cords during phonation	3. No flickering of vocal cord during phonation
4. Arytenoid cartilage are medially deviated and looks prominent	4. Not medially deviated and does not look prominent
5. On probing arytenoid, vocal cord move	5. Do not move on probing
6. Ary-epiglottic fold has short appearance	6. Ary-epiglottic fold has normal appearance

MUSCLES OF LARYNX

- One muscle abducts (opens) the vocal cords i.e. :
 - (1) Posterior crico-arytenoid muscle (also called 'Safety muscle of the larynx')
- Two adduct (close) the vocal cords i.e. :
 - (1) Lateral crico-arytenoid muscle
 - (2) Interarytenoid muscle
- One adjusts the length i.e. :
 - (1) Cricothyroid muscle (it is partial adductor also)
- Two adjust the tension i.e. :
 - (1) Thyro-arytenoid muscle
 - (2) Vocalis muscle

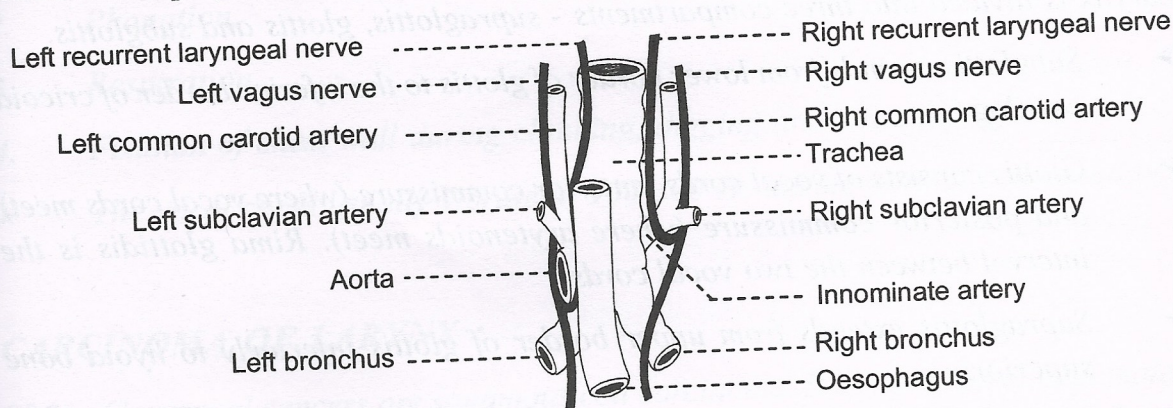
- *Bowing of Vocal Cords - occurs due to weakness of thyro-arytenoid muscle.*
- *Triangular Gap Posteriorly - occurs due to weakness of interarytenoid muscle.*
- *Keyhole Appearance - occurs due to weakness of the above two muscles.*

The length of vocal cord at different age is -

- *at birth 7 mm,*
- *at puberty 14 mm,*
- *in adult female 15-16 mm,*
- *in adult male 17-21 mm.*

NERVE SUPPLY OF LARYNX :

All the muscles of larynx are supplied by recurrent laryngeal nerve except cricothyroid, which is supplied by external branch of superior laryngeal nerve. The internal branch of superior laryngeal nerve with ascending branch of recurrent laryngeal nerve forms the loop of Galen.



Course of left & right recurrent laryngeal nerve

The left recurrent laryngeal nerve has longer course. During the development of larynx the dorsal part of the sixth aortic arch and the whole of fifth aortic arch disappears on the right side, thus right recurrent laryngeal nerve is on the caudal aspect of the fourth arch which becomes subclavian artery. On the left side, sixth and fifth aortic arches retain their position as ductus arteriosus, which is found in adults as ligamentum

arteriosum. Due to the longer course, the left recurrent laryngeal nerve is more vulnerable to injury. The right recurrent laryngeal nerve passes deep to inferior constrictor and enters the larynx behind the cricothyroid joint through the Killian Jamieson area. It is termed recurrent due to the change in direction of laryngeal nerves to reach larynx.

LYMPHATIC DRAINAGE OF LARYNX :

- *Supraglottis : drains to pre-epiglottic and upper deep cervical lymph nodes.*
- *Subglottis : drains to pre-laryngeal and para-tracheal lymph nodes and lower deep cervical lymph nodes.*
- *Glottis : Vocal cords have no lymphatic drainage and act as water shed. Occasionally a small node on cricothyroid membrane may be present prelaryngeal (Delphian) node but its involvement in tumour spread is rare. The saccule (also known as oil-can of the vocal cords) provides lubrication of vocal cords.*

LARYNGEAL COMPARTMENTS :

Larynx is divided into three compartments - supraglottis, glottis and subglottis.

- *Subglottis extends from lower border of glottis to the inferior border of cricoid cartilage.*
- *Glottis consists of vocal cords, anterior commissure (where vocal cords meet) and posterior commissure (where arytenoids meet). Rima glottidis is the interval between the two vocal cords.*
- *Supraglottis extends from upper border of glottis inferiorly to hyoid bone superiorly.*

LARYNGEAL SPACES :

- *Reinke's space : It is the submucosal space between the mucosa of the glottis and underlying vocalis muscle. This space permits the ripple like motion of mucosa during phonation. This space was discovered by the German anatomist, Reinke.*

Surgical importance of this space - Very early glottic cancers remain superficial and rarely penetrate the deeper tissue. The mucosa of vocal cord can be stripped

off without damage to underlying tissue & without alteration in voice.

- Pre-epiglottic space (space of Boyer) : This is fat filled space lying between the hyoid bone and thyrohyoid membrane anteriorly and infrahyoid epiglottis posteriorly.

Surgical importance of this space- Tumour invasion of this space signifies advance disease. This space is rich in lymphatics and relatively radio-resistant due to sparse blood supply.

- Para-glottic space : It is potential space between mucosa of larynx and the thyroid cartilage. This space contains the thyro-arytenoid muscle.

Surgical importance of this space- Infiltration of this space and muscle causes fixity of vocal cord.

FUNCTIONS OF LARYNX :

1. *Protection of lower air passage - by closure of laryngeal inlet by cough reflex and by the closure of glottis.*
 2. *Phonation.*
 3. *Respiration.*
 4. *Fixation of chest wall during climbing, digging and straining efforts.*
- *The vocal cords usually vibrate at 100-300 Hz during normal conversation.*

CARCINOMA OF LARYNX :

90 % of laryngeal cancers are squamous cell carcinoma. It is more common in males and smokers. The larynx for the purpose of tumour classification is divided into three regions :

1. Supraglottis : *It includes laryngeal surface of the epiglottis, ary-epiglottic fold, arytenoids, false cords, and ventricles. The lingual surface of epiglottis and vallecula are in the oropharynx.*
2. Glottis : *It comprises vocal cords, anterior and posterior commissures.*

3. Subglottis : It consists of walls of subglottis & from under surface of vocal cords to lower border of cricoid cartilage.

1. **Supraglottis Cancer :**

It presents in one of the three ways :

- (a) *As large exophytic growth on laryngeal surface of the epiglottis.*
- (b) *As relative small discrete growth on ary-epiglottic fold.*
- (c) *As isolated ulcerative growth on the false cords.*

Symptoms : These tumours do not invade the vocal cords so rarely present with hoarseness. They present with vague type of symptoms like increased expectoration or lump in the neck as metastatic gland.

2. **Glottis Cancer :**

It presents as two distinct types :

- (a) *A small tumour limited to vocal cords.*
- (b) *A large tumour involving supraglottis, glottis and subglottis (also known as transglottic tumour).*

Symptoms : Hoarseness of voice is the first and most early symptom. Carcinoma glottis has best prognosis as :

- (1) *patient seeks early treatment due to hoarseness and henceforth diagnosed early.*
- (2) *there are no lymphatics in the glottis and glottis acts as watershed, so there is no lymphatic metastasis.*

3. **Subglottis Cancer :**

It presents as dyspnoea / dyspnoea on exertion. Hoarseness occurs only when growth is very advanced and has involved vocal cords.

Classification of Carcinoma Larynx

L TNM Classification

T - Primary Tumour

T1s - Carcinoma in situ

T0 - No evidence of primary tumour

T1 - Tumour confined to one region with normal mobility

T2 - Tumour extension to the adjacent sites without fixation

T3 - Tumour confined to the larynx with fixation

T4 - Tumour extension beyond the larynx

Tx - The minimum requirement to assess the tumour cannot be met

N - Regional Lymph Nodes

N0 - No evidence of regional lymph node involvement

N1 - Involvement of homolateral mobile lymph nodes

N2 - Involvement of contralateral or bilateral mobile lymph nodes

N3 - Fixed regional lymph nodes

Nx - The minimum requirement to assess the lymph nodes cannot be met

M - Distant Metastasis

M0 - No distant metastasis

M1 - Distant metastasis

Mx - The minimum requirement to assess the distant metastasis cannot be met

II. Broders' Classification

Grade 1 0 - 25% cells are undifferentiated.

Grade 2 25 - 50% cells are undifferentiated.

Grade 3 50 - 75% cells are undifferentiated.

Grade 4 75 - 100% cells are undifferentiated.

- *Grade 4 tumours are anaplastic tumours with no tendency for keratin formation and the stroma is diffusely infiltrated. They respond to radical surgery or radiotherapy or both.*
- *Grade 1 tumours respond to conservative surgery.*

Hidden Areas of Larynx

- *Posterior surface of epiglottis.*
- *Anterior commissure*
- *Subglottis*
- *Ventricles*

Premalignant Conditions of Larynx

- *Leukoplakia*
- *Erythroplakia*
- *Keratosi*
- *Papilloma*
- *Carcinoma in-situ*

Different Types of Staging

- *Clinical stage : At the time of diagnosis*
- *Surgical evaluation staging : At the time of surgery*
- *Histological staging : After the removal of specimen*
- *Retreatment staging : After the recurrence*
- *Autopsy : After the death at the time of postmortem*

EXAMINATION OF NECK

(Excluding the Thyroid Gland)

HISTORY

- Branchial fistula is congenital and present since birth.
- Branchial sinus and cystic hygroma although congenital but present only when child has grown-up.
- Inflammatory swellings may occur at any age.
- Secondary carcinoma occurs more commonly in old age.
- Submandibular salivary gland calculus has history of increase in size of swelling in the submandibular triangle during meal.

LOCAL EXAMINATION

Inspection

(i) Swelling :

- Examine its site, size, shape and surface etc. like any other swelling.
- Branchial cyst is situated at the upper part of neck and the posterior part of swelling is under cover of upper third of sternomastoid muscle.
- Carotid body tumour lies under the anterior margin of sternomastoid muscle at the level of upper border of thyroid cartilage (at the level of bifurcation of common carotid artery).
- Aneurysm is a pulsating swelling in the line of carotid artery.
- Sternomastoid tumour is an oval swelling of the sternomastoid muscle in the newborn.
- Dermoid cyst occurs in the midline of neck more commonly in the lower part - 'Space of Burns'.
(Space of Burn is a narrow interval between the deep and superficial layers of the cervical fascia above the manubrium sterni through which pass the anterior jugular vein).

- Cystic hygroma is in the lower part of posterior triangle. (Cervical rib also shows prominence at this site.)
- Multiple lymph nodes on both the sides are common in the posterior triangle.
- Ask patient to swallow the saliva - Thyroid-swelling and thyroglossal cyst moves with deglutition but thyroglossal cyst moves up also with protrusion of tongue.

(ii) Skin

- Redness and oedema of skin suggests inflammation.
- Tuberculous sinus or fistula is due to bursting of caseous lymph nodes.
- Branchial fistula is commonly seen at lower third of anterior border of sternomastoid.

Palpation

Ask patient to flex the neck and turn slightly towards the side which is to be examined in order to relax the muscles and fascia.

(i) Swelling :

Examine its site, size, shape, surface, margin, consistency, reducibility, impulse on coughing and mobility like in any other swelling.

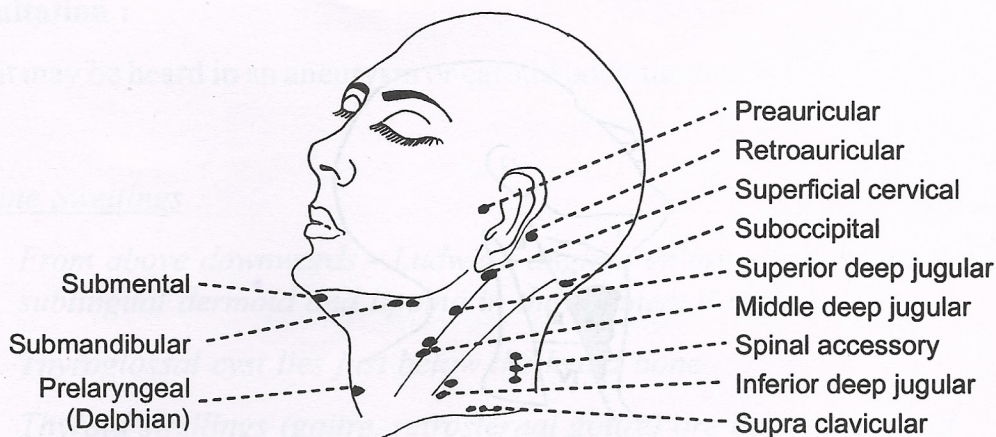
- Examine the swelling in relationship with sternomastoid muscle.
 - On one side- by keeping your hand against the chin opposite to the site of swelling and ask patient to press against the resistance.
 - On both sides- ask patient to press the chin against the resistance where both the sternomastoid muscles come into the action.
- If swelling is beneath the sternomastoid which is quite often, swelling disappears. If swelling is superficial to muscle, it becomes prominent.

(ii) Lymph Nodes :

There are 500 lymph nodes in the body and out of these 200 are in the head and neck region. They range from 3 mm to 3 cm. in size but most nodes are less than 1 cm. in size.

Lymph nodes to be examined are submental, submandibular, jugulodigastric, jugulo-omohyoid, supraclavicular, pre-auricular, post-auricular and occipital.

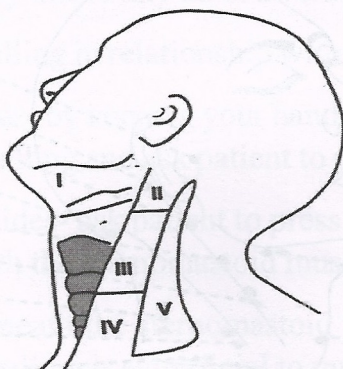
- If submental nodes are involved - examine chin, central part of lip, gingiva, floor of mouth and tip of tongue and nasal vestibule.
- If submandibular nodes are involved - examine palate, tongue, floor of mouth, gingiva, upper lip, lateral part of lower lip, cheek, lower nasal cavity and maxillary antrum. They drain into superior deep jugular chain.
- If jugulodigastric and jugulo-omohyoid are involved - examine tonsil, tongue, mouth, pharynx, larynx, upper oesophagus and thyroid.
- *Retropharyngeal nodes - receive drainage from nasopharynx, posterior nasal cavity, paranasal sinuses, posterior part of oropharynx and hypopharynx. They drain into deep jugular chain.*
- *Spinal accessory - They are located along the spinal accessory nerve and receive drainage from parietal and occipital regions of scalp, nape of neck, upper retropharyngeal and parapharyngeal nodes. Upper spinal accessory nodes drain into upper deep jugular chain and lower spinal accessory nodes drain into supraclavicular nodes.*



Lymphatic chain of neck

Groups of lymph nodes for metastases from head and neck primary sites:

- Level I :** Submental and submandibular group of lymphnodes.
- Level II :** Upper jugular group- Lymph nodes located around the upper third of internal jugular vein and consists of jugulodigastric nodes. Level II is subdivided into Level IIA (anterior to vertical plane),Level IIB (posterior to vertical plane) by accessory nerve.
- Level III :** Middle jugular group- Lymph nodes located around middle third of internal jugular vein and consists of jugulo-omohyoid nodes and may contain the jugulo-digastric node.
- Level IV :** Lower jugular group- Lymph nodes located around lower third of internal jugular vein and consists of some jugulo-omohyoid nodes.
- Level V :** Posterior triangle group-Lymph nodes are located along lower half of spinal accessory nerve and transverse cervical artery. Level V is subdivided into Level VA (above the horizontal plane), Level VB (below the horizontal plane) along the inferior border of anterior cricoid arch.
- Level VI:** Anterior compartment group(Visceral group) - Lymph nodes surrounding midline visceral structures of the neck and consists of paratracheal, pretracheal, perilaryngeal and precricoid lymph nodes.
- Level VII :** Lymph nodes in the upper anterior mediastinum.

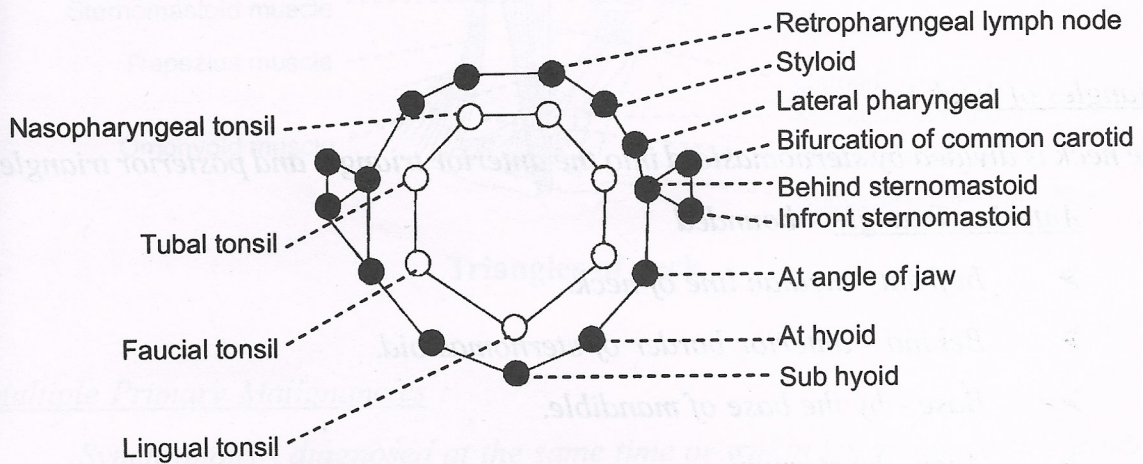


Lymph node levels in the neck

Waldeyer's Ring : (Waldeyer was professor of anatomy in Berlin)

It consists of :

1. *Inner ring* : formed by lingual tonsil, palatine tonsil, tubal tonsil, nasopharyngeal tonsil.
2. *Outer ring* : lymph nodes at retropharyngeal, styloid, lateral pharyngeal, behind sternomastoid, at bifurcation of common carotid, in front of sternomastoid, at angle of jaw, at hyoid and subhyoid.



Waldeyer's ring

Auscultation :

A bruit may be heard in an aneurysm or carotid body tumour.

Mid line Swellings :

- *From above downwards - Ludwig's angina, enlarged submental lymph node, sublingual dermoid and lipoma in the submental region*
- *Thyroglossal cyst lies just below the hyoid bone*
- *Thyroid swellings (goitre, retrosternal goitre) are below the hyoid*
- *Dermoid cyst may occur anywhere in the midline*

Swellings on the Side of Neck :

Commonest swellings on the side of neck is enlargement of deep cervical lymph nodes.

- *In submandibular triangle - enlarged submandibular lymph nodes, enlarged submandibular salivary gland, deep or plunging ranula, extension of growth of jaw.*
- *In carotid triangle - branchial cyst, carotid body tumour (potato tumour), aneurysm of carotid artery.*
- *In posterior triangle - enlarged supraclavicular lymph nodes, cystic hygroma, lipoma, pharyngeal pouch, cervical rib.*

Triangles of Neck :

The neck is divided by sternomastoid into the anterior triangle and posterior triangle.

1. Anterior Triangle - bounded

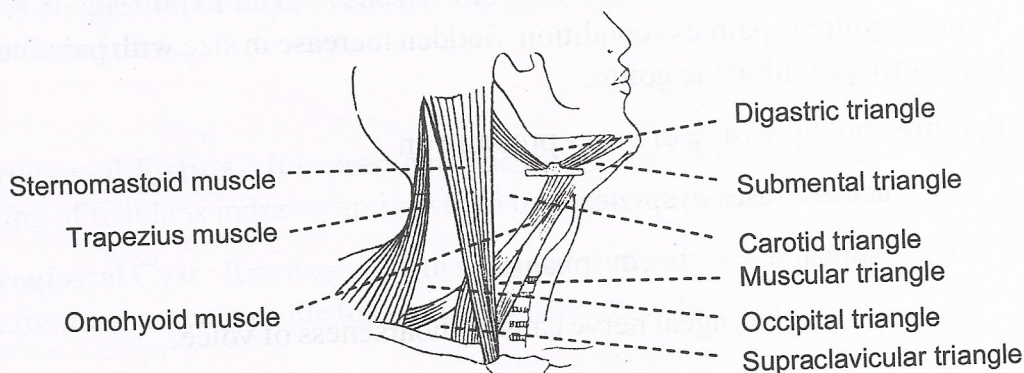
- *In front - median line of neck.*
- *Behind - anterior border of sternomastoid.*
- *Base - by the base of mandible.*
- *Apex - by sternum.*

It is divided by the digastric and superior belly of omohyoid into the 4 triangles called (1) Digastric, (2) Submental, (3) Carotid, (4) Muscular.

- (1) Digastric Triangle : *It is bounded above by lower border of mandible, anteriorly by anterior belly of digastric muscle, posteriorly by posterior belly of digastric muscle.*
- (2) Submental Triangle : *On the side is anterior belly of digastric, base by hyoid bone and apex by symphysis menti.*
- (3) Carotid Triangle : *It is bounded by anterior border of sternomastoid, superior belly of omohyoid and posterior belly of digastric muscle.*
- (4) Muscular Triangle : *It is bounded anteriorly by midline of neck, superolaterally by superior belly of omohyoid, inferolaterally by lower part of anterior border of sternomastoid.*

2. Posterior Triangle - bounded

- Anteriorly - by the posterior border of sternomastoid
- Posteriorly - anterior border of trapezius
- Base - middle third of clavicle.
- Apex - meeting of sternomastoid and trapezius

**Triangles of neck**Multiple Primary Malignancies :

1. *Synchronous* - diagnosed at the same time or within six months of identifying the primary lesion.
2. *Metachronous* - develops after six months of identifying the primary lesion.

The structures which does not have lymphatics are brain, bone, bone marrow, nerve, cartilage, epithelium, perineurium, membranous labyrinth, eyeball, placenta.

EXAMINATION OF THYROID GLAND

HISTORY

- Physiological goitre occurs in girls at puberty.
- Hashimoto's disease occurs in women who have just passed the menopause.
- Usually goitre is painless condition. Sudden increase in size with pain indicates haemorrhage within the goitre.
- Enquire about pressure effects - pressure on
 - trachea causes dyspnoea,
 - oesophagus causing dysphagia
 - recurrent laryngeal nerve causing hoarseness of voice.

GENERAL EXAMINATION

Look for excitability, trembling, nervousness, sweating, wasting etc.

LOCAL EXAMINATION

Inspection

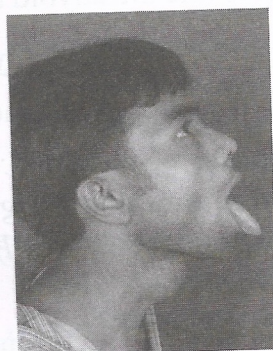
1. Position : The normal thyroid consists of two lateral lobes joined together by a central isthmus, which overlies the second and third tracheal rings.
2. Size : The normal thyroid is palpable in about 25% of men and 50% of women. Consider goitre if the lateral lobes of thyroid gland have a volume in excess of that of terminal phalanx of the thumb of the patient.
3. Shape : The gland is usually symmetrical in primary hyperthyroidism, while it is irregular in secondary or nodular toxic goitre.
4. Overlying Skin : The colour changes over goitre are unusual unless it is very big, the distended veins may be responsible for dusky blue appearance.
5. Surface, Pulsation etc. are to be inspected.
6. Mobility : Ask patient to swallow, thyroid swelling moves upwards on

swallowing (as thyroid gland is ensheathed by the pretracheal fascia). Other swellings like subhyoid bursitis, prelaryngeal and pretracheal lymph nodes also move with deglutition as they are fixed to hyoid, larynx or trachea.

In retrosternal goitre, pressure on the great veins at the thoracic inlet gives rise to dilatation of subcutaneous veins over upper anterior part of thorax (Pemberton's sign.). Ask patient to raise both arms for sometime touching the ear. In retrosternal goitre there is congestion of face, cyanosis, and distress due to obstruction to the great veins at the thoracic inlet.

Thyroglossal Fistula : It is seen near the midline a little below the hyoid bone. The opening of fistula is indrawn and covered by a crescent fold of skin

Thyroglossal Cyst : It moves up with protrusion of tongue as thyroglossal duct extends from foramen caecum of the tongue to the isthmus of thyroid gland.



Palpation

The thyroid gland should be palpated from the front and from the behind with the patient's neck slightly flexed. The patient is asked to swallow during the palpation. Any enlargement of thyroid gland or any nodule is appreciated by placing the thumb on the thyroid gland during the swallowing (as by Crile jr.)

Palpation of each lobe is carried out by Lahey's method in which examiner stands in front of patient and in order to palpate the right lobe, the thyroid gland is pushed to the right from the left side. The lobe is thus made prominent and palpated with the other hand.

During the palpation observe the position, extent shape, etc. of the swelling.

1. Consistency :

A cystic swelling of the thyroid gland may feel solid and a solid swelling cystic as fluid in the cyst is under great tension and imparts a solid feeling, while cellular swellings having no tension feels soft. When thyroid swelling feels stony hard, think of carcinoma or Riedel's thyroiditis.

2. Pain and Tenderness :

It may occur in thyroiditis.

3. Mobility :

Move the thyroid horizontally and vertically. Fixity is present in carcinoma and chronic thyroiditis.

4. Relationship :

Observe its relationship with neighbouring structures like trachea, larynx, oesophagus, recurrent laryngeal nerve, carotid sheath, sympathetic trunk, and the muscles like infrahyoid and sternomastoid muscle.

5. Involvement of Neighbouring Structures :

➤ Involvement of sympathetic trunk gives rise to *Horner's syndrome*

Horner's Syndrome : pseudoptosis (slight drooping of upper eye lid), enophthalmos (slight sinking of eyeball into the orbit), myosis (contraction of pupil), anhidrosis (absence of sweating of the affected side of face).

➤ Involvement of recurrent laryngeal nerve in malignant growth produces hoarseness of voice.

➤ Involvement of oesophagus produces dysphagia.

6. Position of Trachea and Larynx :

Observe whether Trachea and Larynx is displaced by swelling or not. A thyroid swelling may compress the trachea from both sides giving scabbard trachea, which can be known by Kocher's test i.e. stridor on pressing lateral lobe of thyroid.

(A benign swelling of thyroid gland displaces the carotid sheath backwards and the pulsation of carotid artery is felt, while carcinoma of thyroid swelling engulfs the carotid sheath completely and carotid pulsation is not felt.)

Auscultation :

In primary toxic goitre a systolic bruit may be heard due to increased vascularity, called 'thyroid thrill' (Guttman sign).

Measurement :

Measurement of circumference of neck at the most prominent part is taken to know swelling is increasing or decreasing in size.

Primary Toxic Goitre :

The four cardinal features of primary toxic goitre :

1. *Exophthalmos or protrusion of eyeball*
2. *Enlargement of thyroid gland*
3. *Tachycardia*
4. *Tremor*

Certain Signs are attached with exophthalmos :

1. *Von Graefe's sign - lagging behind of the upper eyelid when patient looks downward*
2. *Stellwag's sign - retraction of upper eyelid*
3. *Dalrymple's sign - widening of palpebral fissure*
4. *Joffroy's sign - absence of wrinkling of the forehead on looking upwards with the face inclined downward*
5. *Moebius' sign - Difficulty in convergence of eye*

Thyroid Storm :

It is the exaggerated state of hyperthyroidism. It is life threatening. The precipitating factor is thyroid surgery in patient of hyperthyroidism not well prepared before the surgery.

*The term thyroid derived from : 'Thereos' - means shield
'Eidos' - means form.*

EXAMINATION OF CRANIAL NERVES

There are 12 cranial nerves :

1. Olfactory Nerve
2. Optic Nerve
3. Oculomotor Nerve
4. Trochlear Nerve
5. Trigeminal Nerve
6. Abducent Nerve
7. Facial Nerve
8. Vestibulo-Cochlear Nerve
9. Glossopharyngeal Nerve
10. Vagus Nerve
11. Accessory Nerve
12. Hypoglossal Nerve

Olfactory Nerve (1st) :

The olfactory system is made up of olfactory area in brain, olfactory epithelium, olfactory bulb and olfactory tract.

Testing Smell :

Take small bottles containing clove oil or peppermint oil. Present these to each nostril separately with patients eyes closed and ask patient to recognise the smell. Avoid the use of irritants substance such as ammonia as it stimulates the trigeminal nerve. Common bedside substances like soap, fruit or scent may also be used.

Optic Nerve (2nd) :

Test for visual acuity and visual fields.

- Visual acuity is tested by the Snellen's chart
- Visual field is tested by the confrontation test

Sit down in front of the patient at a distance of 1 meter. Keep your hands approximately 50 cm apart and 30 cm above the patient. Bring your finger medially from away to near. Patient and examiner should see the finger simultaneously. Test the field in every direction- upward, downward, to the left and to the right. Make sure during this test patient does not deviate the eyes. Both the eyes should be tested separately.

Occulomotor (3rd), Trochlear (4th) and Abducent (6th) Nerve :

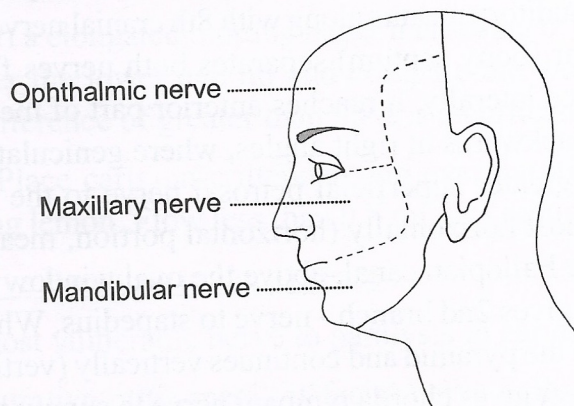
Remember the formula- LR6 SO4 REST3 (Lateral rectus is supplied by 6th nerve. Superior oblique by 4th nerve, rest ocular muscles are supplied by the 3rd cranial nerve).

Ask patient to look at your finger and then move finger upwards, downwards, abduction and adduction.

Trigeminal Nerve (5th) :

This nerve separates into three divisions immediately distal to trigeminal ganglion,

1. The first or Ophthalmic division - supplies the conjunctiva and the conjunctival surface of upper lid (but not of lower lid), lacrimal gland, medial part of skin of the nose upto tip, the upper eyelids, the forehead, and the scalp upto the forehead.
2. The second or Maxillary division - supplies the cheek, the front of temple, the lower eyelid and its conjunctival surface, the side of nose, the upper lip, the upper teeth, the mucus membrane of the nose, the upper part of pharynx, the roof of the mouth, part of soft palate, and the tonsils.
3. The third or Mandibular division - supplies the lower part of face, the lower lip, the tongue, and the lower teeth. It also supplies parasympathetic fibres to the salivary gland. The mandibular division is joined by motor root and this innervates the muscles of mastication.



Supply of trigeminal nerve over skin of face

(Sir Charles Bell in 1821 demonstrated that trigeminal nerve (Bell's nerve) carried both sensory and motor function)

Testing :

Motor Function :

- (a) Ask the patient to clench his teeth and feel the masseter and temporalis muscle of both sides simultaneously. If there is paralysis on one side, the muscle on that side will not contract.
- (b) On asking the patient to open the mouth, the jaw will deviate towards the affected side owing to paralysis of pterygoids.

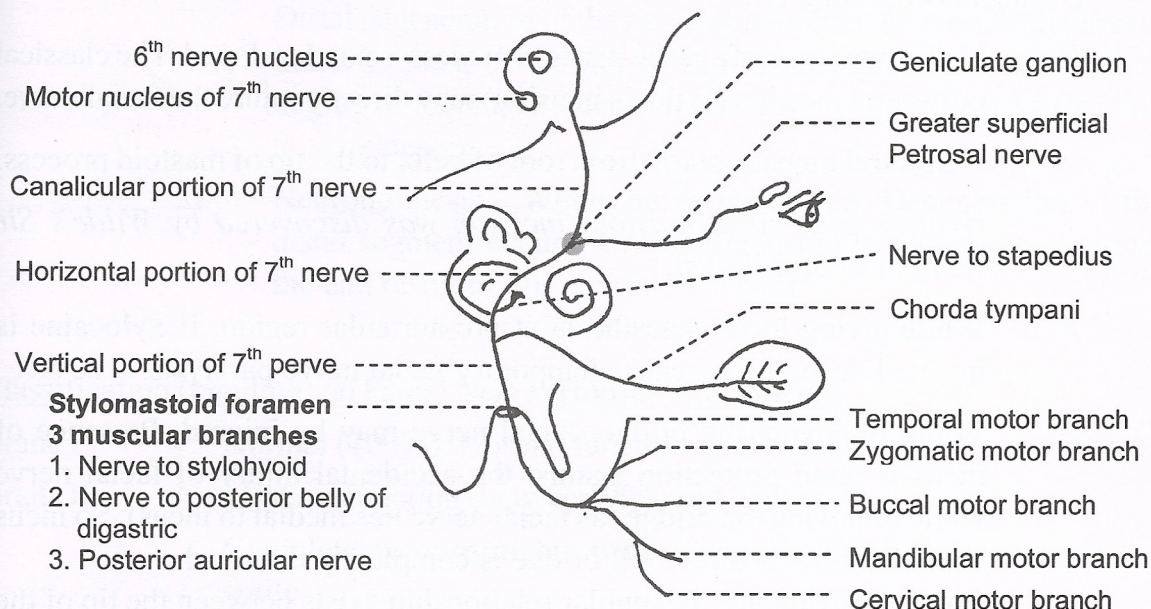
Sensory Function :

- (a) Sensation over the face is supplied by all the three divisions of nerve.
- (b) Taste sensation- Keeping the eyes closed ask patient to protrude the tongue and apply salt or sugar on the anterior surface of tongue. The patient should not speak but write down what taste he gets.
- (c) Reflex - test for sneezing reflex (by tickling the nasal mucosa) and corneal reflex.

Facial Nerve (7th) :

Facial nerve arises in pons from 7th nerve nucleus. It winds around 6th nerve nucleus to come out from the cerebellopontine angle and enters the petrous part of temporal bone through internal auditory meatus along with 8th cranial nerve (canalicular portion). At this place, Bill's bar (bony septum) separates both nerves from each other. After travelling some distance laterally, it reaches anterior part of medial wall of tympanic cavity. Here it bends backwards at right angles, where geniculate ganglion is situated and gives 1st branch, greater superficial petrosal nerve to the lacrimal gland. After genu, nerve passes almost horizontally (horizontal portion, measures 10 to 12 mm in length), enclosed in the Fallopiian canal, above the oval window and below the lateral semicircular canal and gives 2nd branch - nerve to stapedius. When it reaches aditus it turns downward behind the pyramid and continues vertically (vertical portion, measures 13 mm in length) where it gives chorda tympani nerve to supply taste fibers to anterior $\frac{2}{3}$ rd of tongue and palate. At stylomastoid foramen it gives 3 muscular branches -

(1) nerve to stylohyoid, (2) nerve to posterior belly of digastric and (3) posterior auricular nerve. Then it enters the parotid gland and divides initially into two main trunks - zygomaticotemporal and cervicomandibular. These then divide into 5 peripheral branches - (1) temporal, (2) zygomatic, (3) buccal, (4) mandible and (5) cervical.



Facial Nerve

Motor Function : (Refer examination of facial nerve in ear chapter).

Sensory Function : Put salt, bitter, and sour substances on one side of tongue and then on the other side alternately. Tip of tongue is sensitive to sweet, back of tongue to bitter and side of tongue is sensitive to sour and salt.

Electrogustometry is better way of testing taste sensation.

Secreto-Motor Function :

Schirmer's test - Insert a elongated blotting paper measuring 0.1 mm thick, 5 mm wide and 30mm long under the lower eye lid and compare the wetting of blotting paper after some time. A difference of greater than 90% is significant.

Salivary flow rate - Place carlsson-crittenden cup over parotid duct after maximum stimulation by sucking lemon. Flow less than 0.5 ml. in a minute suggests xerostomia.

Causes of Facial Nerve Paralysis in Ear Disease :

Facial nerve is the most vulnerable nerve to paralysis in ear diseases e.g.

1. In acute suppurative otitis media if facial nerve is dehiscent in the fallopian canal, the infection may cause paralysis.

2. In acute mastoiditis if infected air cells lie directly over the dehiscent facial nerve.
3. In carcinoma of middle ear, malignant growth may invade facial nerve.
4. During mastoid surgery :
 - Under two years of age the mastoid process is not developed. The classical post-aural incision (Wilde's incision) may directly injure the facial nerve.
Post-aural incision starts from root of helix to the tip of mastoid process.
(Wilde's post-aural mastoid incision was discovered by Wilde's Sir William Robert Willis).
 - While giving local anaesthesia at pre-auricular region, if xylocaine is injected deep, it may cause temporary facial nerve paralysis.
 - While removing the bridge, facial nerve may be injured. Presence of incus is good protection against the accidental injury of facial nerve while removing the bridge (as facial nerve lies medial to incus). So incus should not be disturbed till bridge is completely removed.
Triple 'S' Triangle : Triangular relationship exists between the tip of the short process of the incus, the facial nerve and the lateral semi-circular canal. It provides easiest landmark for the identification of the facial nerve.
 - While lowering the facial ridge, facial nerve may be damaged.
 - While removing cholesteatoma - if facial nerve is dehiscent at that particular point, facial nerve is also lifted up while removing the cholesteatoma sac.
 - While removing the outer attic wall, the other side of burr may injure the facial nerve.

Parotid surgery may cause facial nerve injury as facial nerve traverses through the parotid gland. Tragal pointer (cartilaginous pointer) is good landmark for its identification as facial nerve is located medial and inferior to it. (Cartilaginous pointer is an artificially created landmark formed by the posterior traction on the external auditory canal. The backward pull on the cartilage causes the meatus to assume the shape of horn.)

- Subtotal resection of temporal bone or petrosectomy for the carcinoma of middle ear or carcinoma of parotid gland, if malignant growth is engulfing the nerve, facial nerve is deliberately sacrificed otherwise in all the surgeries all the efforts are made to preserve this nerve.

Three classic degrees of damage to the nerve (Seddon classification) :

- 1) Neuropraxia : There is no anatomical disruption but only physiological block which is temporary.
- 2) Axonotmesis : The axon sheath is intact but the axon is divided. Distal degeneration of the nerve fibre occurs. As the sheath remains intact so most of the fibres tend to regenerate. Unfortunately a degree of mismatch occurs with wrongly placed axons (leading to synkinesis).
- 3) Neuronotmesis - Whole nerve is severed. Degeneration of the distal segment occurs. Unless the lesion is accurately repaired, the end result of this condition is poor.

Classification (Grading) on Facial Nerve (House - Brackmann)

- | | |
|-----------|--|
| Grade I | - Normal (100%). Normal function of all zones. |
| Grade II | - Mild dysfunction (between 99% and 75%).
Complete eye closure but with minimal effort. Slight asymmetry of smile |
| Grade III | - Moderate dysfunction (between 75% and 50%). There is obvious palsy with difference between the two sides but no disfigurement. |
| Grade IV | - Moderately severe loss of function (between 50% and 25%). There is obvious weakness with asymmetry of face with disfigurement. |
| Grade V | - Severe loss of function (between 25% and 0%) with asymmetry of face. |
| Grade VI | - Total paralysis (0%). There is no movement, loss of tone and asymmetry of face. |

Electro-Diagnostic Tests of Facial Nerve

- Quantitative nerve excitability test
- Strength duration test
- Electromyography
- Electroneurography
- Polyphasic motor unit potential

Topognostic Tests (Tests for the Anatomical Diagnosis)

- Lacrimation-Schirmer's Test
- Hyperacusis or Phonophobia - stapedia reflex by tympanometry
- Taste- Electrogustometry
- Salivary flow rate

Bell's Palsy :

It is an acute idiopathic unilateral lower motor neuron facial nerve paralysis. The various theories for Bell's palsy are :

- *Viral*
- *Vascular ischaemia - the nerve suffers malnutrition due to diminished blood supply and ischaemic paralysis results.*
- *Idiopathic*

Treatment :

- (1) *Drugs - high dosage of steroids (prednisolone), neurotropic agents like Vit. B₁, B₆, B₁₂, vasodilators like pentoxifylline and antivirals like acyclovir*
- (2) *Care of eye in the form of artificial tears like methyl cellulose eye drops and eye padding during sleep to prevent corneal damage*
- (3) *Physiotherapy of the paralysed muscles.*

(The role of facial nerve decompression is very controversial. When electroneurography shows degeneration of 95% of nerve fibres, decompression may be undertaken.)

Bell's Phenomenon :

When patient attempts to close the eye on the affected side, there is restricted movement of the orbicularis oculi but there is brisk upward movement of the eyeball. This phenomenon occurs only in the lesion of 7th nerve.

- *Delayed blinking is the earliest sign of Bell's palsy.*
- *Procerus is the first muscle to recover during the recovery of Bell's palsy.*

Vestibulo-cochlear Nerve (8th) :

Rinne's Test and Weber's Test for examination of cochlear part.

Recording of nystagmus for the examination of vestibular part. Caloric test and electronystagmography are useful methods for recording of nystagmus.

Glossopharyngeal Nerve (9th) :

Test for the loss of sensation of the posterior third of tongue and the back of pharynx with a probe, first on one side then on the other side.

Gag Reflex :

Touch the back of the tongue or pharynx or the fauces of tonsil with a tongue depressor. There will be contraction of pharynx, cough and elevation of uvula. In unilateral paralysis, there will be movement of pharyngeal wall towards the normal side called 'curtain movement'.

Vagus Nerve (10th) :

Ask patient to open the mouth and say 'Aah' and observe the movement of palate. In paralysis, the affected side of the palate will remain immobile.

Accessory Nerve (11th) :

Sternomastoid muscle is tested. Ask patient to turn the head on the opposite side and the resistance is offered at the chin. The paralysed muscle will not be prominent. Test for trapezius by asking patient to raise the shoulder and apply pressure downwards to check the paresis of trapezius.

Hypoglossal Nerve (12th) :

Ask patient to protrude the tongue. In paralysis the tip of the tongue points towards the paralysed side.

X-RAYS IN E.N.T.

1. X-ray Paranasal Sinuses Occipito-Mental View (Water's View)

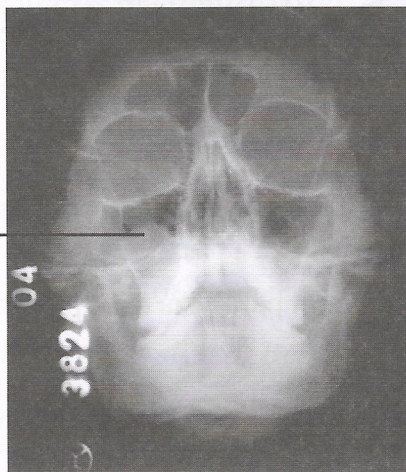
This view shows maxillary sinuses, orbit, anterior ethmoidal group of sinuses and frontal sinuses. The foramina seen in this x-ray are foramen ovale, foramen rotundum, infra-orbital foramen.

Haziness of right
maxillary sinus
(Maxillary sinusitis)



X ray showing haziness of maxillary sinus suggestive of right maxillary sinusitis

Polyp in
maxillary sinus



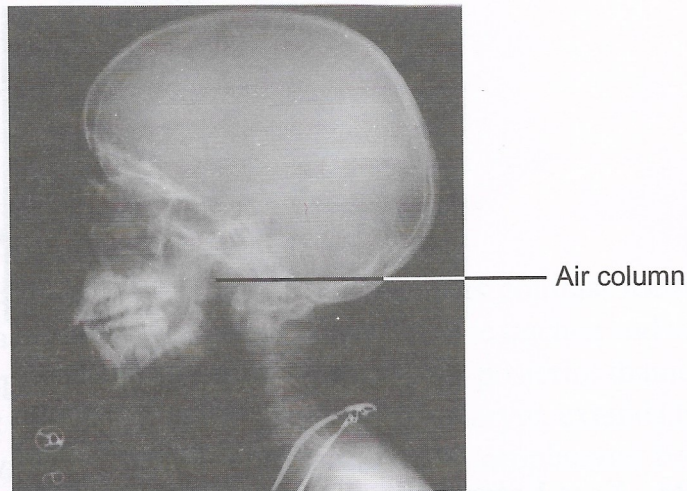
X-Ray showing polyp in the right maxillary sinus

2. X-ray Paranasal Sinuses Occipito-Frontal View (Caldwell's View) :

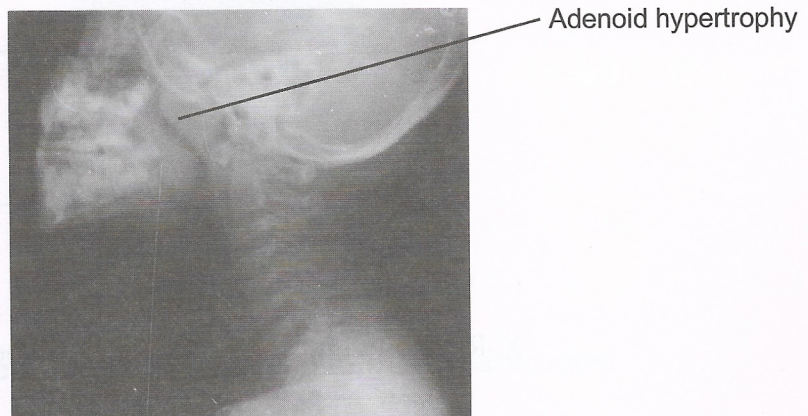
This view shows frontal sinus, nasal cavity, the medial wall of maxillary antrum and the ethmoid air cells.

3. Lateral View of Skull :

The frontal, sphenoid and maxillary sinuses are visualised, specially the posterior wall of maxilla and the pterygopalatine fossa, the posterior aspect of nasopharynx and hypophyseal fossa is also seen.

4. X-Ray Nasopharynx Lateral View :

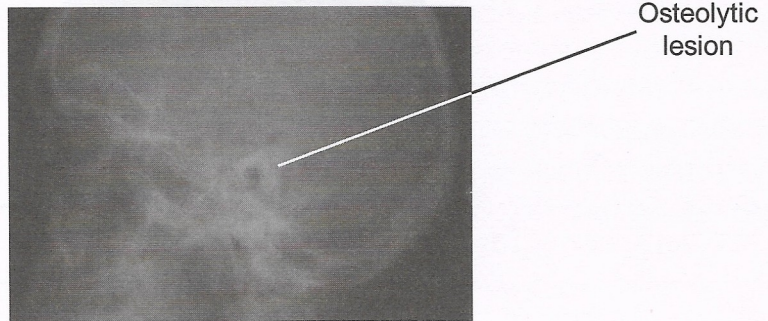
Antrochoanal polyp in the nasopharynx and presence of air column between polyp and posterior wall of nasopharynx.



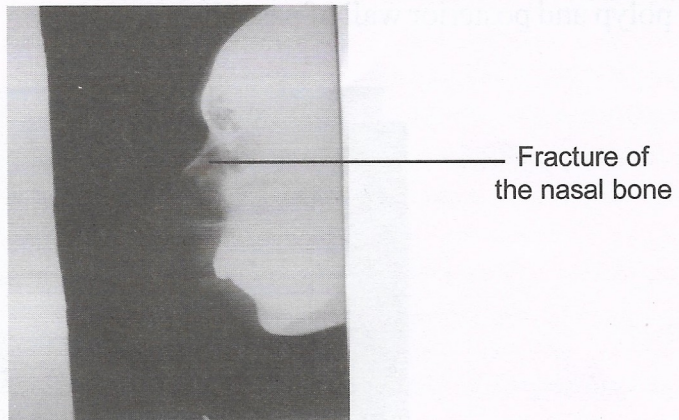
X-Ray nasopharynx showing adenoid hypertrophy.

5. X-Ray Mastoid Schuller's View :

It is the lateral view of mastoid with 30° cephalocaudal angulation. This view demonstrates atticoantral area (It is a 'key area' where cholesteatoma may invade initially and produce erosion), cellularity of mastoid, size of mastoid bone with its air cells, tegmen, attic with head of malleus, lateral sinus, anterior wall of temporomandibular joint and external auditory meatus. The sclerotic mastoid (also found in 20% of normal ear) may show an osteolytic lesion is suggestive of cholesteatoma. It may show forward lying sinus & low lying dura. Surgeon should be cautious during mastoid surgery.

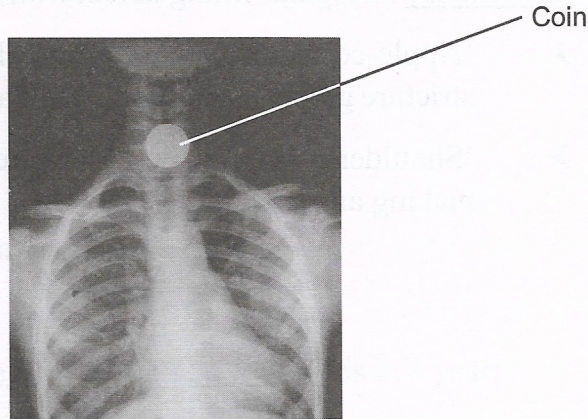


X-Ray showing osteolytic lesion

6. X-Ray Nose Lateral View for Fracture Nasal Bone :

X-Ray showing fracture of the nasal bone

7. Anteroposterior View of the Neck and Chest showing coin in the Cricopharynx :

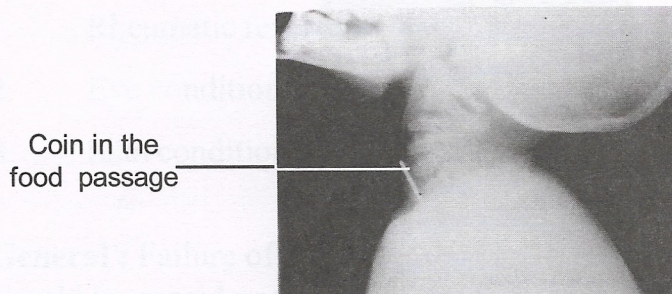


X-Ray showing coin

8. Lateral Soft Tissue X-Ray of Neck :

This x-ray uses natural air of pharynx and larynx as contrast medium. (The retropharyngeal space between the posterior wall of the trachea and the anterior border of cervical spine should not exceed the antero-posterior diameter of one vertebral body. If it exceeds, it is pathological.) The larynx extends from C3 to C6. The nasopharynx is seen above the soft palate, oropharynx between the soft palate and base of tongue and hypopharynx from the base of tongue inferiorly.

(Coin is the commonest foreign body in children. If it is in air passage, it requires bronchoscopy and if in the food passage requires oesophagoscopy.)



Lateral view of the neck showing coin as linear shadow

9. Barium Swallow of Oesophagus :

i. Malignancy : Irregular filling defect with obstruction.

- 'Apple-core' appearance - normal mucosa above and below the stricture giving the appearance of an eaten apple.
- 'Shouldering effect' due to everted margins of malignant ulcer making an acute angle.



ii. Achalasia Cardia :

- There is regular dilatation of oesophagus with stricture at the lower end giving appearance of 'Bird beak'.
- 'Rat tail' appearance is seen as oesophageal lumen becomes very narrow and thin streak of barium passes through it.



OPERATIONS

TONSILLECTOMY

Indications

The indications of tonsillectomy are :

(i) Local :

1. More than three attacks of acute tonsillitis in a year.
2. Repeated sore throat occurring 4-6 times in a year or more.
3. Chronic enlargement of cervical lymph node in association with sore throat.
4. Quinsy.
5. Recurrent middle ear infection in association with sore throat or acute tonsillitis.
6. Chronic infection with beta-haemolytic streptococci or diphtheria organisms in carriers.
7. Tuberculous cervical adenitis is adversely affected by superadded chronic infection.

(ii) Focal : Septic Foci for -

1. Rheumatic fever and glomerulonephritis.
2. Eye conditions-episcleritis, recurrent conjunctivitis, choroiditis.
3. Skin condition -psoriasis.

(iii) General : Failure of child to grow (most controversial point and tonsillectomy should be considered only when all other conditions for the child growth have been excluded).

(iv) Chronic Enlargement of Tonsil : Gross hypertrophy of the tonsil interfering with respiration, swallowing, speech or causing sleep apnoea.

Indications for Removal of Normal Tonsils :

1. As an approach for the glossopharyngeal neurectomy.
2. As an approach for the enlarged styloid process causing styalgia.

Indications for Unilateral Tonsillectomy :

1. Suspected malignancy of tonsil.
2. Suspected ulcer of tonsil.
3. Benign tumour of tonsil.
4. As an approach to styloid process or glossopharyngeal nerve.

Contraindications of Tonsillectomy :

1. Epidemic of poliomyelitis (it is an only absolute contraindication of tonsillectomy, as polio virus may enter through exposed nerve endings).

The other relative contraindications are :

2. Hypertension.
3. Blood dyscrasias- Haemophilia and leukaemia.
4. Acute infection of tonsil.

Methods :

There are different methods of tonsillectomy-

1. Dissection method
2. Guillotine method
3. Cryosurgery
4. Laser surgery
5. Harmonic scalpel
6. Coablation (bipolar) & Radio frequency (monopolar)

Dissection method is the most commonly used method for the surgery. It is done in the Rose's position. The advantage of Rose's position is that it allows the blood to collect in nasopharynx and not in the throat.

Steps of Tonsillectomy :

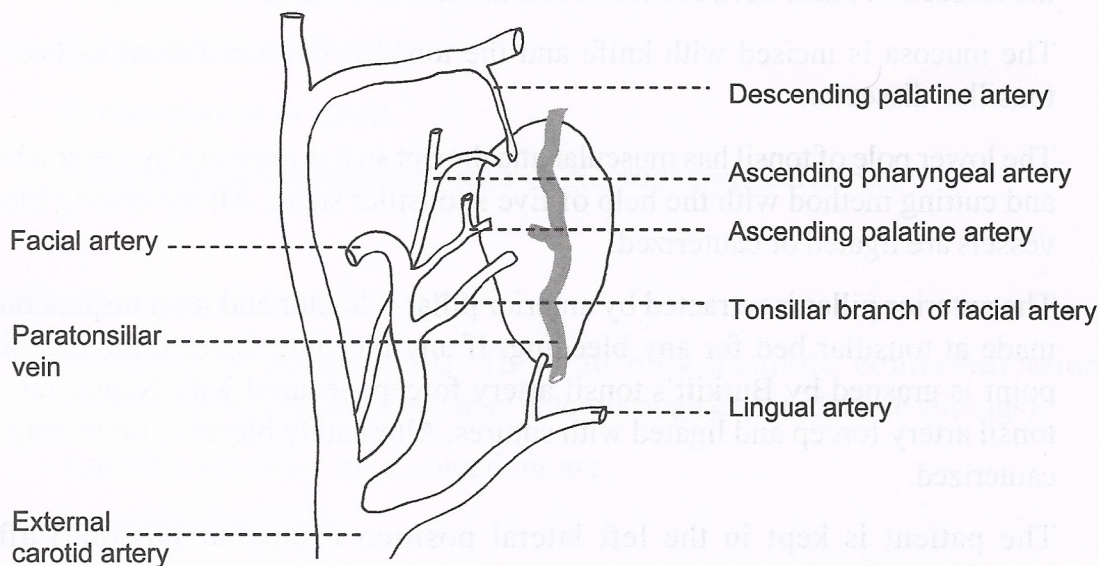
- Tonsils are exposed by Boyle Davis mouth gag and tongue depressor.
- Tonsil is held by the tonsil holding forceps and pulled medially for demarcating the dissection plane between tonsil and the anterior pillar.
- The mucosa is incised with knife and the tonsil is dissected from its bed by tonsillar dissector.
- The lower pole of tonsil has muscular attachment so it is removed by the crushing and cutting method with the help of Eve's tonsillar snare. All the oozing blood vessels are ligated or cauterized.
- The anterior pillar is retracted by anterior pillar retractor and final inspection is made at tonsillar bed for any bleeding. If any bleeding is seen, the bleeding point is grasped by Burkitt's tonsil artery forcep, secured with Negus curved tonsil artery forcep and ligated with sutures. Alternately bleeding point may be cauterized.
- The patient is kept in the left lateral position (Tonsillar position) after tonsillectomy in the postoperative period.

Complications :

1. Primary haemorrhage, which occurs during the surgery.
2. Reactionary haemorrhage, which occurs 4-6 hours after the surgery. It occurs due to slippage of ligature due to the rise of blood pressure after the effect of anaesthesia wears off and due to postoperative reactionary oedema. The treatment is securing the bleeding vessels under general anaesthesia. If bleeding is not controlled by this, suturing of anterior and posterior pillars is undertaken.
3. Secondary haemorrhage - occurs 5-10 days after the surgery. It is due to infection and needs change of antibiotics, sedation and rest.

Arterial Supply of Tonsil : Tonsil is supplied by -

1. Tonsillar branch of facial artery (Main arterial supply of the tonsil)
2. Ascending palatine artery
3. Branch of ascending pharyngeal artery
4. Branch of dorsal lingual artery
5. Descending palatine artery

Venous Drainage of Tonsil :

- Tonsillar venous plexus drains into the pharyngeal venous plexus.
- Few veins drain via paratonsillar vein into the internal jugular vein.

Bed of Tonsil :

Bed of tonsil is formed by loose areolar tissue, pharyngobasilar fascia, superior constrictor muscle, buccopharyngeal fascia, internal carotid artery (Internal carotid artery is about an inch lateral to tonsil).

Relationship of Tonsil :

- | | |
|---|--|
| (i) Anterior border - Palatoglossus | (ii) Posterior border - Palatopharyngeus |
| (iii) Upper pole - related to soft palate | (iv) Lower pole - tongue |

Plica Triangulous (it is a triangular vestigial fold of mucous membrane at antero inferior part of tonsil)

Plica Seminularis (it is a similar semilunar fold at upper part of tonsillar sinus).

ADENOIDECTOMY

Indications

1. Large adenoid tissue occupying almost whole of nasopharynx :
(a) obstructing eustachion tube for ventilation (b) causing snoring.
2. Adenoid as a source of infection in nasopharynx.

Steps

- Adenoid curette is used to shave off the adenoid from the nasopharynx and the cage prevents it from slipping.
- This instrument is to be held like a dagger and passed into nasopharynx.
- With firm pressure it is swept downwards remaining strictly in the midline to avoid damage to the eustachian tube.
- At the level of lower end of soft palate it is withdrawn to cause clean cut of the nasopharyngeal mucosa.
- If both tonsillectomy and adenoidectomy are to be carried out, first carryout adenoidectomy as bleeding after the adenoid removal is controlled by the packing at postnasal space. By the time tonsillectomy is completed, bleeding of adenoid will stop. It is important that the one end of postnasal pack be secured at the cheek by a tape so that surgeon remembers to remove it after the tonsillectomy otherwise it may be missed.
- While removing the adenoid, it is important to remove the sand bag below the shoulder otherwise it may cause dislocation of atlanto-axial joint.
- For adenoid removal oral intubation should be done as in nasal endotracheal intubation the complete removal of adenoid is not possible.
- Before introducing the adenoid curette, surgeon must palpate the nasopharynx to exclude any aberrant vessel in the nasopharynx.



MASTOIDECTOMY

Cortical Mastoidectomy (Schwartz's Operation) :

It is the exenteration of infected mastoid air cells. The mastoid air cells are :

- Mastoid antrum - It is the largest air cell.
 - Zygomatic air cells (at zygoma).
 - Tip cells - (1) superficial cells lie superficial to posterior belly of digastric. (2) deep cells lie deep to the attachment of posterior belly of digastric. The superficial and deep cells are separated by the digastric ridge. The facial nerve lies anterior to it.
 - Subdural air cells (below the dural plate).
 - Perisinus air cell (around lateral sinus).
 - Sinodural angle cells (at the angle of lateral sinus and dural plate).
 - Perilabyrinthine air cells (around labyrinth) - supra-labyrinthine, infra-labyrinthine and retro-labyrinthine cells.
 - Perifacial and retro facial air cells (around facial nerve).
 - Peritubal cells (around eustachian tube).
 - Petrosal cells-at body and apex of petrous bone.
- Cortical mastoidectomy is done in acute mastoiditis.
 - Acute mastoiditis occurs only in cellular mastoid.

The Clinical Features of Acute Mastoiditis are - fever, pain in the ear, mastoid tenderness, sagging of postero-superior meatal wall, reservoir sign (discharge reappears after cleaning), mastoid tenderness and congestion of tympanic membrane.

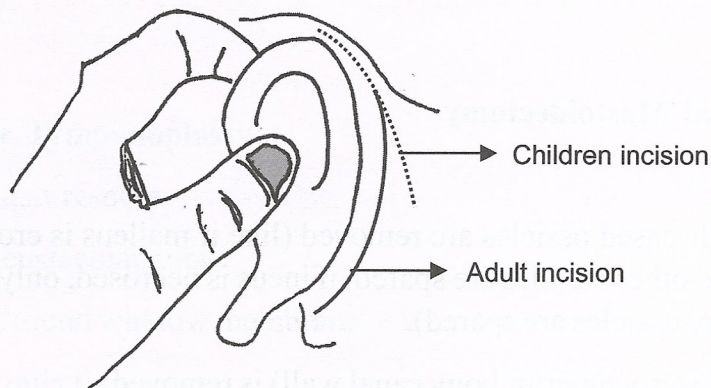
X-ray shows coalescent mastoiditis.

The steps of Cortical mastoidectomy are :

- Incision : Post aural Wilde's incision is given , starting from the root of helix to the tip of mastoid process, about 0.5 to 1 cm. behind the post aural groove.

In children under 2 years of age, the tip of mastoid process is not developed. If classical post aural incision is given, facial nerve may be injured. So almost horizontal incision is given in children.

(Wilde's incision was discovered by Wilde, Sir William Robert Willis)



- Elevation of periosteum.
- Antrum Identification : The site of mastoid antrum is identified by Macewen's triangle or postero-superior to the spine of Henle. This area looks sieve like with increased vascularity. While drilling the antrum one should be aware of (1) injuring a forward-lying sigmoid sinus, (2) injuring low middle fossa dura, (3) injuring pyramidal segment of facial nerve where it curves downwards to begin its vertical mastoid course (4) Korner's septum.

Korner's Septum ('False Antrum') : It is the persistence of petrosquamous suture in the adult life. It forms the false bottom of the mastoid antrum and may mislead the surgeon leading to incomplete removal of the disease. If such a situation is encountered, identification of aditus identifies the mastoid antrum.

- Exenteration of all mastoid air cells.
- Widening of the Aditus to Antrum.

Radical Mastoidectomy

In this surgery mastoid antrum, middle ear and external auditory canal are converted into a single cavity. All the mastoid air cells are removed, all the ossicles are removed except footplate of stapes, eustachian tube opening at middle ear is closed and the entire tympanic membrane is removed. This surgery is hardly being done.

The indications of radical mastoidectomy are -

1. unresectable cholesteatoma extending to eustachian tube,
2. promontory cochlear fistula due to cholesteatoma,
3. chronic perilabyrinthine osteitis or unresectable cholesteatoma.

Modified Radical Mastoidectomy

In this surgery :

- a) Only the diseased ossicles are removed (like if malleus is eroded only malleus is removed other ossicles are spared, if incus is necrosed, only incus is removed and healthy ossicles are spared).
- b) Bridge (postero-superior bony canal wall) is removed.
- c) Facial ridge is lowered.
- d) Meatoplasty is done.
- e) Eustachian tube opening is not closed, and remnant of tympanic membrane is used for tympanoplasty.

(The blind spaces in the middle ear are facial recess and sinus tympani. The disease is likely to be left behind in these areas, if not cleared specifically. The long process of incus is the earliest to get necrosed due to poor blood supply.)

The indications of modified radical mastoidectomy are :

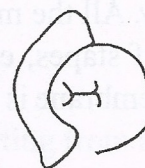
- (1) Cholesteatoma, (2) Granulation tissue, which recur after its removal, (3) Mastoid abscess or sinus, (4) Facial palsy occurring with otitis media, (5) Foul smelling discharge inspite of proper antibiotic and antiseptic treatment, (6) Intra-cranial complications, (7) Meatal stenosis.

- Meatoplasty helps in the drainage of operated mastoid bowl and speeding up of epithelisation of mastoid cavity.

The different types of meatoplasty : (1) Korner's (2) Siebenmann's meatoplasty.



Korner's meatoplasty



Siebenmann's meatoplasty

TYMPANOPLASTY

Tympanoplasty is the reconstruction of the sound conducting pathway, which has been damaged by the disease (or by mastoid surgery carried out essentially to remove the disease).

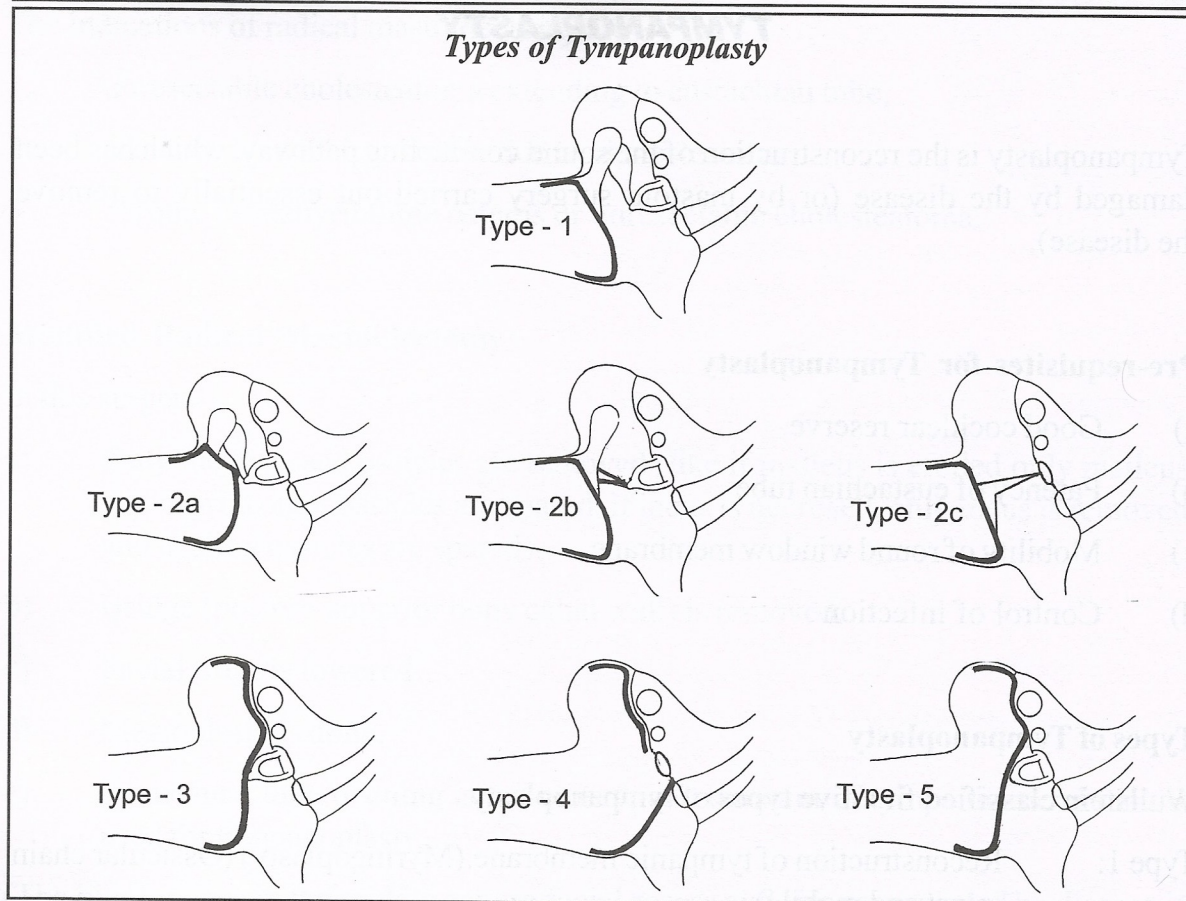
Pre-requisites for Tympanoplasty

- a) Good cochlear reserve.
- b) Patency of eustachian tube
- c) Mobility of round window membrane.
- d) Control of infection

Types of Tympanoplasty

Wullstein classified first five types of tympanoplasty

- Type 1: Reconstruction of tympanic membrane.(Myringoplasty) (Ossicular chain intact and mobile).
- Type 2 :
 - Type 2a - Deformed but functioning ossicular chain
 - Type 2b- Malleus-stapes assembly
 - Type 2c - New constructions independent of malleus
- Type 3 : Malleus and incus are absent and reconstruction of tympanic membrane over intact and mobile stapes and stapes acting like columella (as in birds). This type of tympanoplasty is called columella type of tympanoplasty or simply myringostapediopexy.
- Type 4 : (Baffle effect) Oval window and mobile footplate exposed and sound protection (baffle) for the round window.
- Type 5 : Stapes fixed, fenestration operation.
- Type 6 : *Sonoinversion- Round window is exposed to receive the sound waves while graft is placed to protect the oval window.*

Types of Tympanoplasty

Patch Test : It is useful test before doing myringoplasty to know whether hearing will improve after the surgery? A cigarette paper cut to the size of tympanic membrane is kept over the perforation with the help of liquid paraffin and hearing is tested. The improved hearing after the patch test (positive patch test) indicates that there may be improvement in hearing after myringoplasty.

Grafts used for Tympanoplasty

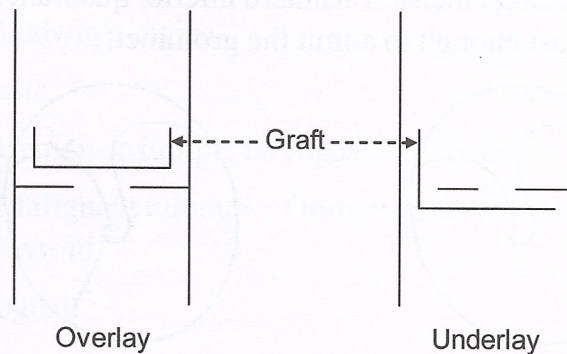
- a) Auto grafts i.e. tissue taken from one part of body to another in the same individual i.e. temporalis fascia, tragal perichondrium, fascia lata from thigh, fat or vein graft. They are most commonly used grafts. Temporalis fascia is most commonly preferred as it has low metabolic rate and has good survival prospect. It is readily available via post-aural, end-aural or an independent incision. It should be taken as high as possible over the surface of temporalis muscle where it is thin and of good quality. It is spread on a hard surface and allowed to dry. It is not advisable to dry the temporalis fascia graft by heat as it may be devitalised in parts leading to high incidence of graft failure.

For ossiculoplasty -ossicular bone, cortical bone or tragal cartilage can be used.

- b) Homografts- Cartilage, ossicles and bone.
- c) Biomaterials- Polyethylene (plastic), ceramics, teflon, gold. These biomaterials are available as -
 - PORP (Partial ossicular replacement prosthesis)
 - TORP (Total ossicular replacement prosthesis)

Techniques of Tympanoplasty :

- **Overlay Technique :** The graft is kept over the remnant of tympanic membrane after removing the epithelial layer of tympanic membrane. This technique is difficult to perform hence not very popular. The complications of this technique are :
 1. Pearl formation if epithelial layer is not removed completely so epithelium continues to grow underneath the graft, leading to pearl formation.
 2. Blunting of anterior sulcus & lateralisation of graft.
- **Underlay technique-** the graft is kept under the remnant of tympanic membrane. This technique is very easy to learn and to adapt, hence very popular. The medialisation of graft specially anteriorly is the commonest complication and to prevent this complication, the eustachian tube opening in the middle ear should be packed with gel foam. There is no chance of graft cholesteatoma as no epithelial cells are left under the graft.



Techniques of tympanoplasty

MYRINGOTOMY

It is incision of the tympanic membrane :

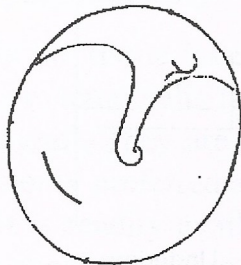
Indications

1. Acute suppurative otitis media :
 - (a) Severe ear ache with bulging of tympanic membrane
 - (b) Complications of acute suppurative otitis media like onset of facial paralysis or labyrinthitis.
 2. Serous otitis media
 3. Non suppurative otitis media
(For insertion of grommet for the aeration of middle ear)
- It is done in general anaesthesia in children and local anaesthesia in adults.

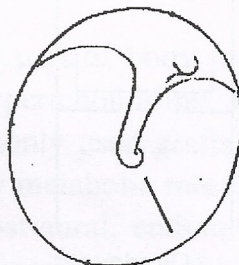
Site of Incision

In ASOM - Circumferential incision is made at postero inferior quadrant of tympanic membrane.

In Serous Otitis Media - Radial Incision at antero inferior quadrant (for grommet insertion the incision should be just enough to admit the grommet.)



Circumferential incision



Radial incision

Myringo Puncture : It is done to drain out fluid from the middle ear. Such puncture heals rapidly.

TRACHEOSTOMY

Tracheotomy means making an opening in the trachea, while tracheostomy means converting this opening into a stoma on the skin surface.

Indications

I. Laryngeal Indications :

A. Congenital :

1. Laryngeal web or stenosis
2. Bilateral choanal atresia
3. Tracheo-oesophageal anomalies

B. Traumatic :

1. External - gunshot, blow injuries, strangulation or cut throat injuries of larynx.
2. Internal- inhalation of hot fumes, swallowing of corrosives or foreign body.

C. Infective :

1. Acute epiglottitis
2. Acute laryngotracheobronchitis
3. Diphtheria
4. Ludwig's angina

D. Neoplastic :

1. Benign : Multiple laryngeal papilloma
2. Malignant tumours of tongue, pharynx, larynx, upper trachea and thyroid.

E. Neurological :

1. Tetanus
2. Myasthenia gravis
3. Bilateral abductor cord palsy
4. Bulbar poliomyelitis.

F. Allergic- Angio-neurotic oedema**II. Tracheobronchial Indications :****A. Tracheobronchial toilet :**

1. Loss of cough reflex- like in bulbar poliomyelitis or diseases of cervical spinal cord
2. Unconsciousness- head injury, coma

B. Tracheobronchial foreign bodies**III. Pulmonary Causes :**

1. Chronic emphysema, fibrosis, collapse
2. Severe chest injuries, flail chest
3. Respiratory paralysis

IV. As an Adjuvant for Surgery :

1. Laryngectomy
2. Laryngofissure, total glossectomy and mandibulectomy
3. Temporomandibular joint surgery where endotracheal intubation is not possible and mouth cannot be made to open due to temporomandibular joint ankylosis.

Functions of Tracheostomy

1. Relief of upper airway obstruction
2. Bronchial toilet
3. Reduction of dead space - by 30-50% (from lip to trachea)
4. Allows positive pressure ventilation
5. Reduces airflow resistance
6. Protection against aspiration

Types of Tracheostomy

- A
1. Elective Tracheostomy - It is planned surgery under general anaesthesia e.g. temporomandibular joint ankylosis.
 2. Emergency Tracheostomy - Respiratory failure, coma etc.
- B
1. Temporary
 2. Permanent : After total laryngectomy
- C. Sites of Tracheostomy :
1. High Tracheostomy - When it is done above the isthmus of the thyroid gland.
 2. Mid Tracheostomy - When it is done at the level of isthmus. (2nd, 3rd and 4th tracheal rings). It is the most commonly performed tracheostomy.
 3. Low Tracheostomy - When it is done below the isthmus. (5th and 6th tracheal rings)

➤ First tracheal ring should never be incised as it causes tracheal stenosis.

Procedure of Tracheostomy :

- **Position** : Keep the patient in supine position with sand bag under the shoulder to make the neck extended.
- **Incision** : Give vertical incision exactly in the midline from the lower border of cricoid cartilage to the suprasternal notch.
- **Dissection** : Cut the skin and subcutaneous tissue. In the midline there is no muscle. If any muscle comes in view, it is retracted. Keep on palpating the trachea with the little finger. With blunt artery forcep, dissection is deepened further till the pre-tracheal fascia is reached.
- **Tracheal Incision** : Before making incision on trachea, take 4% xylocaine in syringe, introduce in trachea and withdraw the plunger, air bubble in syringe confirms the position of needle in trachea. Inject 4% xylocaine in trachea to prevent cough reflex in conscious patients and circular opening is made on the 2nd or 3rd tracheal rings. (Some time after giving incision on trachea, there is

apnoea due to sudden release of pentup carbon dioxide from within the lungs as airway obstruction has been suddenly bypassed. Close the opening and give mouth to trachea respiration (as exhaled breath contains 4% carbon dioxide) or give carbogen if available. (Carbogen is the mixture of 95% oxygen and 5 % carbon dioxide)

- Introduction of Tube : Introduce the tracheostomy tube with pilot. After the introduction, remove the pilot and check the patency of tube with a wisp of cotton, which moves with respiration (wool test).
- Fixation of Tube : Neck should be flexed to relax the neck muscles while securing the tracheostomy tube . If it is tied with the head extended, the strap muscles are taut and when the head is later flexed the tape becomes loose and the tube may come out of the trachea. The knot of tape should be complete to prevent the extrusion of tube during coughing and on one side of the neck. The tape should not be too tight and should allow one finger to pass.
- Inflation of Cuff : If a cuffed tube is used, the cuff should be inflated.
- Dressing around the tracheostomy tube over the incision site.

Postoperative Care

1. Nursing Care : Paper and pen or slate should be provided to the patient, as patient cannot speak. Bell should be provided to the patient in case patient needs any assistance.
2. Humidification : Wet gauze piece should be kept over the tube for the humidification. The steaming kettle also provides the humidification of the whole room but it also causes soiling of clothes hence not preferred.
3. Secretion Removal : Secretions should be removed by suction every half hourly in first 24 hours and thereafter every 1 to 2 hours. Sterile catheter kept in savlon bottle should be available with the suction. While doing suction, the catheter should be pinched while introducing and while removing otherwise will cause tracheal mucosa necrosis.
4. Changing of Tube : Tracheostomy tube should not be disturbed for first 24 to 48 hours for the epithelization of tract. Afterwards tube should be cleaned daily at regular intervals.
5. Care of Inflatable Cuff : In case of cuffed tube, cuff should be deflated every one hour for five minutes to prevent tracheal necrosis.

Complications of Tracheostomy :**A. Immediate :**

1. Haemorrhage
2. Blockage of tracheostomy tube
3. Displacement of tube
4. Central respiratory failure
5. Damage to surrounding structures - dome of pleura, oesophagus and high innominate artery
6. Anaesthetic complications- cardiac and respiratory arrest

B. Intermediate :

1. Reactionary or secondary haemorrhage
2. Surgical emphysema - due to tight suturing of incision
(suture must be removed if emphysema develops)
3. Pneumothorax
4. Dysphagia
5. Infection
6. Tracheal necrosis
7. Tracheo oesophageal fistula

C. Late

1. Laryngeal stenosis (if high tracheostomy is performed)
2. Tracheal stenosis
3. Difficult decannulation
4. Depressed scar

Sequelae of Tracheostomy :

1. Loss of speech
2. Head bath or swimming is not permitted
3. Weight lifting is difficult
4. Foreign bodies or flies may enter the tube
5. Anosmia - as patient does not breathe through nose

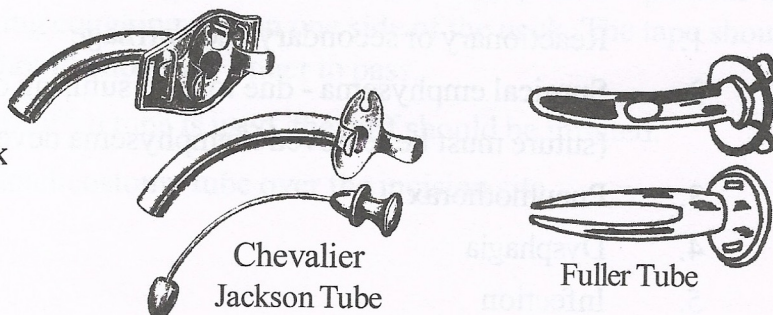
Time to do Tracheostomy :

- (a) If $p\text{CO}_2$ exceeds 65 mm of Hg. or $p\text{O}_2$ falls below 50 mm of Hg. in unconscious patient.
- (b) If vital capacity falls 25% of normal.
It can be assessed clinically by asking patient to take deep inspiration and count 1,2,3. A normal person can count upto 60, if a patient cannot count even 20, urgent tracheostomy is needed.
- (c) Ask patient to blow off lighted matchstick at the distance of one meter. A normal person should be able to blow off.
- (d) If patient has stridor at rest and is using accessory muscles of respiration.

Types of Tube :

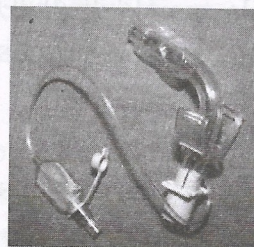
1. Metallic

- (a) Chevalier Jack
- (b) Fuller Tube



2. Non-Metallic

PVC - Cuffed and Non-Cuffed



Cuffed PVC Tube

Size of Tube :

The approximate size of the tube can be calculated as :

- Upto six years of age : $(\text{Age in years} / 3) + 3.5$
- Over six years of age : $(\text{Age in years} / 4) + 4.5$

OR

- Approximately the size of the distal phalanx of the patient's little finger.

Tracheostomy Vs. Intubation :Mosher's Dictum : The time to do tracheostomy is the time you first think of it.

Now it is changed to - "when you think of doing tracheostomy, intubate, and think again."

- Intubation can be kept for 72 hours but beyond that period tracheostomy should be carried out. The use of hydrocortisone in inflammatory conditions has decreased the need of tracheostomy, that's why it is also known as medical tracheostomy. At times introducing a wide bore needle in trachea in acute emergency also serves the purpose in small children.
- Laryngotomy (Cricothyrotomy) - It is a horizontal incision in cricothyroid membrane. It is done only in dire emergency due to non-availability of instruments for tracheostomy or endotracheal intubation.
- Percutaneous Tracheostomy - In this procedure trachea is punctured with needle and guided wire is passed using graded dilaters, tracheostomy tube is passed.
- Mini Tracheostomy - It is vertical stab incision through cricothyroid membrane. It allows ready access, delivery of oxygen and the removal of chest secretion.

Differences between Child Tracheostomy and Adult Tracheostomy

Anatomical Difference

Child Tracheostomy	Adult Tracheostomy
1. The space available is smaller	1. The space available is not that small
2. Larynx lies higher in the neck and is not easily palpable	2. It is not so high and is easily palpable
3. Trachea is soft, smaller and deep beneath the skin	3. Trachea is more superficial

Operative Difference

Child Tracheostomy	Adult Tracheostomy
1. Should not remove section of tracheal ring	1. Section of tracheal ring is removed
2. Cartilage is soft, springy and can be distracted to allow introduction of tracheostomy tube (There is no danger of cartilage necrosis due to pressure on vessels.)	2. It is not so
3. 2 nd , 3 rd or 4 th tracheal ring is divided in midline for the introduction of tube	3. A circular hole is made in trachea
4. No space to use tracheal dilator so tube is introduced with the help of a curved artery forcep without pilot	4. Tracheal dilator is used to keep tracheal ring apart and pilot is used for the introduction

OESOPHAGOSCOPY

Indications :

(i) Therapeutic Indications :

1. It is used for the visualisation of lumen of oesophagus for removing foreign body.
 - In Children : The commonest foreign body is coin and the commonest site is just below the cricopharynx. (The reason being by the time foreign body reaches the cricopharynx, the cricopharyngeal sphincter contracts and coin trickles down due to gravity, so foreign body is held just below the cricopharynx.) Moreover Laimer-Hackermann point (Laimer's triangle) is present below the cricopharynx which is covered with single layer of circular fibre.
 - In Adults : The commonest foreign body is unchewed meat.
 - In Old Age : The commonest foreign body is artificial dentures.
2. For the dilatation of lower end of oesophagus in achalasia cardia. The dilatation should start with the smallest size of gum elastic bougie. When bougie crosses the lower oesophageal sphincter it is felt in the stomach. The dilatation should be continued till the bougie is just blood stained. Beyond that, dilatation may cause tear and subsequently fibrosis and stenosis. Postoperatively patient should be given banana or meshed potatoes. Food is the best dilator of oesophagus.

(ii) Diagnostic Indications : for taking biopsy from suspicious growths. It is also done to diagnose Plummer Vinson syndrome.

Oesophagoscopy is done in Boyce's position i.e. neck is flexed on the chest and head is extended on neck

Contraindications :

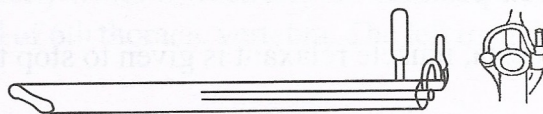
Cervical ankylosis

The complication of oesophagoscopy - perforation of oesophagus.

The commonest causes of perforation during oesophagoscopy are :

- At the upper end- trying to force through cricopharyngeal sphincter especially when sphincter is closed, the tear may occur posteriorly at Laimer's triangle which is potentially weak area.
- At the lower end - while dilating benign strictures or when too deep biopsy is taken. (The biopsy should be taken from the sides of forcep and not from the tip.)

At the time of perforation there is a sudden give way feeling during the scopy. Postoperatively there may be surgical emphysema and pneumothorax and patient complains of pain in the back between the two shoulder blades. Plain chest radiograph may show free gas in the mediastinum. There is also profound dysphagia. The treatment consists of passing of nasogastric tube and broad-spectrum antibiotics to prevent mediastinitis. Patient is kept nil by mouth and asked to spit out saliva. Drugs like probanthine may be given to reduce salivary secretion. The small tear heals by itself if above measures are followed.



The length of oesophagus is 25 cm. and there are 4 normal constrictions in the oesophagus.

- I. The first constriction is the cricopharyngeal sphincter at the level of C6 vertebra and the distance from incisor teeth to cricopharynx is 15 cm.
- II. The second constriction is at crossing of aorta at the level of T4 vertebra and the distance from incisor teeth is 25 cm.
- III. The third constriction is at the bifurcation of trachea at the level of T5 vertebra and the distance from incisor teeth is 27 cm.
- IV. The fourth constriction is at the cardiac end of oesophagus at the level of T10 vertebra and the distance from the incisor teeth is 40 cm.

BRONCHOSCOPY

Indications :

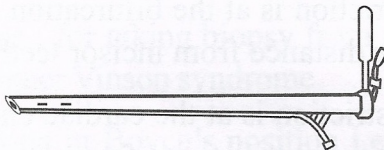
- 1) Therapeutic Indications : for removing foreign body from the bronchus.
Acute foreign body airway obstruction is also known as 'cafe coronary'.
Forcep space - is the space between the foreign body and the wall of bronchus where the blade of forcep can be introduced to remove the foreign body.
- 2) Diagnostic Indications : for taking biopsy from suspicious growths or to investigate haemoptysis.

Contraindications :

Aortic aneurysm, Cervical spine pathology.

Procedure :

- It is done in Boyce's position.
- In general anaesthesia, muscle relaxant is given to stop the movement of vocal cords.
- At the level of glottis, bronchoscope is turned by 90° to the right so that full view of left vocal cord is seen and then it is introduced further.
- After crossing glottis, it is again rotated back to its normal position (bevel tip up).
- The trachea is identified by the tracheal rings. There are 15 - 20 cartilaginous rings, which are incomplete posteriorly, the gap being filled by trachealis muscle.



- At the level of carina trachea is divided into right and left main bronchus. The carina is sharp vertical spur at the distal end of trachea situated between openings of right and left main bronchus and looks like inverted keel. In malignancy there is blunting of carina.

- The right main bronchus is wider than left main bronchus. It is 5 cm. in length and ends at the orifice of the middle lobe bronchus. It makes an angle of 30° with the trachea so almost in direct continuity of the trachea and hence foreign body is more likely to enter into it.

The right main bronchus gives branches to:

1. Upper lobe (apical, posterior and anterior) and their openings are not seen in rigid bronchoscopy.
2. The middle lobe (lateral and medial).
3. The lower lobe (superior, medial basal, anterior basal, lateral basal, and posterior basal).

(On bronchoscopy at the end of right main bronchus, secondary carina is seen lying horizontally.)

- The left main bronchus is longer and narrower than the right main bronchus and makes an angle of 45° with the trachea. To introduce the bronchoscope into left bronchus, the neck has to be turned towards right and slightly flexed, to bring it in continuity with the trachea. It is 5.5 cm. in length and enters the lung at about the level of 6th thoracic vertebra. The left main bronchus gives branches to :

1. The upper lobe (apico-posterior, anterior & lingular lobe - superior and inferior).
2. The lower lobe (anterior basal, posterior basal & lateral basal).

The examination of bronchial tree is done systematically.

1. Rotate the head to the left, examine right main and lower lobe (0°), right upper lobe (90°) and right middle lobe (30°).
2. Rotate the head to the right, examine left main and lower lobe (0°) and left upper lobe (90°).

During bronchoscopy, examine the mucosa, any secretion, any mass, any collapse or blunting of carina.

LARYNGOSCOPY

Indications :

Diagnostic Indications :

Examination of Larynx for benign and malignant lesions of the larynx and the biopsy of suspected lesions, blunt trauma of the neck, vocal cord paralysis, stridor.

Therapeutic Indications :

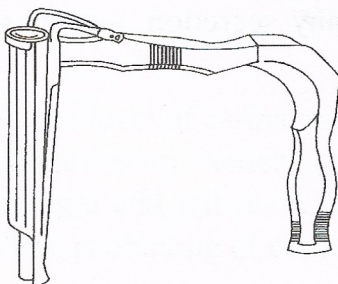
Removal of benign lesions of larynx like vocal cord nodule, polyp, papilloma etc and foreign body removal from larynx and laryngopharynx.

Contraindications : Cervical spine pathology.

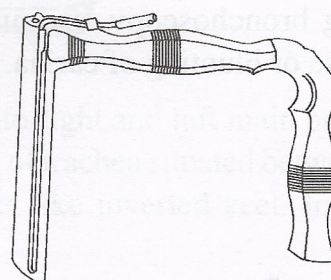
Procedure of Direct Laryngoscopy :

- The patient lies in the same position as in bronchoscopy.
- The laryngoscope is passed along the endotracheal tube.
- The structures examined are - vallecula, the lingual surface of epiglottis, ary-epiglottic folds, pyriform fossae, postcricoid and inter-arytenoid area.
- The laryngoscope is now passed in front of endotracheal tube and laryngeal surface of epiglottis, false cords are retracted laterally and the vocal cords are examined.
- Chevalier Jackson laryngoscope is removed and anterior commissure laryngoscope is passed and anterior half of glottis i.e. anterior commissure is examined.
- With the tip of laryngoscope, vocal cords are retracted and subglottic space on either side is examined.

Chevalier Jackson Laryngoscope

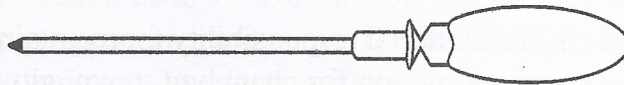


Anterior Commissure Laryngoscope



ANTRAL PUNCTURE WASHOUT (A.P.W.)

- It is done in the inferior meatus. The anaesthesia is achieved either by packing the nose with 4% xylocaine or introducing two swab sticks of 4% xylocaine, one in the inferior meatus at the site of puncture and other in the middle meatus.
- The direction of trocar and cannula should point towards outer canthus or pinna. If it goes too posterior inside maxillary antrum, it may damage the posterior wall of maxilla or the maxillary artery in infratemporal fossa. If it goes superior inside maxillary antrum, it may damage the orbit. If it goes anterior, may make false passage to enter into the cheek causing swelling.
- After doing the puncture, the pus must be aspirated for the culture and sensitivity. The normal saline is pumped inside the antrum for washout. Patient is asked to take respiration through mouth. The antrum is irrigated with normal saline till returning fluid is clear. Air should not be pumped inside the antrum as it may cause air embolism.
- The earlier concept of doing antral washout for 6 times and subsequently Caldwell-luc operation if patient does not improve is no longer practised, as with the introduction of nasal endoscopes, the concept has changed.
- The latest concept in the treatment of maxillary sinusitis is that widening of maxillary antrum ostium allows aeration inside the antrum and subsequent return of pathology to normal.



RULES OF CORRECT ASEPTIC SURGICAL PROCEDURE

1. Hands and arms of surgeon, assistant and nurse are scrubbed for 10 minutes by clock using sterile brush and soap (betadine) under running water. After scrubbing, the arms are held upright to prevent water from unscrubbed upper arm from trickling down over the scrubbed area. Between two cases if the gloves are not removed, 3-4 minutes scrub is enough.
2. The hands and arms are dried by sterile towel given from sterile table. Do not take the towel with wet dripping hand as it will contaminate the entire table. First hands are dried then arm by one end of towel. The other arm is dried by the other end of towel.
3. Observer also wears O.T. dress, cap & mask and covered with sterile gown in "mummy-fashion". Any careless move by the observer contaminates the entire sterile preparation.
4. The gloved hands should never be placed above the clavicle, below the waist line of scrubbed person and should be kept in front of chest.
5. If any solution spilled on sterile drape, the drapes are covered at once with fresh dry sterile towel to prevent the field from becoming unsterile by underlying unsterile area.
6. The contaminated article must be discarded immediately.
7. Everybody in the operation room must be very vigil about any infringement of aseptic technique any time.
8. The sterile nurse is given official responsibility for maintaining complete aseptic technique. The nurse instruction for change of gown, gloves or discard of any instrument should be accepted without question and graciously.
9. The surgeon must change gown and gloves and repeat hand and arm scrub if any time he or sterile nurse suspect possible contamination at any time during the surgery.

Skin Preparation

Normally Staphylococci inhabitate in the superficial layer of skin. The absolute skin sterilization is very difficult to achieve but the thorough cleaning of the skin surface markedly reduces the bacterial population at the skin. The ideal method of skin sterilization is as follows :

1. For any postaural surgery, the hair is clipped for a distance of 2 inches in front, above and behind the ear. Although the shaving of post aural region is very common practice but it traumatizes the skin and increases the incidence of infection.
2. The auricle and postaural area is scrubbed with betadine solution.
3. Drapes are applied over the clipped area thus making the surgical field free from the hair.
4. Sterile drape is placed over the surgical field with auricle exposed through a hole.
5. For any nasal surgery, skin in and around the nose scrubbed with Betadine.
6. For any intraoral surgery, a circumoral scrubbing is done to prevent transfer of resident skin flora to intraoral site. Mouth can also be disinfected by the use of 0.2% chlorhexidine just prior to surgery.
7. For any neck surgery, the scrubbing should begin in the centre of the site, and move outward concentrically, away from the site of operation. This avoids contamination of already scrubbed site of surgery.

Hand Scub Technique-It is the single most important and successful method of controlling the spread of infection. 20 to 30% of surgeon's glove get punctured by the end of operation. The purpose of hand scrub is two fold: The first is to remove the superficial contaminants and loose epithelium by the mechanical action of the brush. The second purpose is to reduce bacterial count on the skin.

The scrubbing begins at the tip of one finger of one hand. The scrubbing is continued along the skin surfaces of fingers, and the interfinger webbing. The scrubbing is continued until all the surfaces of the hand are completed. Then the hands are cleaned along the forearms and the scrubbing is progressed towards the elbow, extending 2" above the elbow. In the similar manner the other hand is scrubbed beginning at the fingertips and scrubbing towards the elbow. After the scrubbing of both the arms the brush is discarded and the arms are rinsed of excess soap. The rinse should be done with arm elevated above the elbow height to enable water to drain from the finger tips progressing down the arm & elbow.

AUDIOLOGY

Sound is a sensation which excites the peripheral auditory apparatus and evokes an auditory response. It comprises of alternate phases of compression and rarefaction of the particle through which sound is being conducted. These phases of compression and rarefaction are represented as wave, the horizontal axis representing time. The displacement of curve above the mean line represents the phase of compression and the portion of curve below the line represents the phase of rarefaction. The amplitude of displacement above or below the line denotes intensity of sound. The speed of sound is 340 m/s. The higher speed is called supersonic.

The sound wave which produces the sensation is divided into two classes :

- Sounds which are quite irregular in character, called noise.
- Sounds which are smooth and regular in rhythm, called the musical sound.

1. Frequency : It is the vibration of sound wave at a particular rate per second (cycles/second).

The normal ear is sensitive to 20-20,000 cycles/second. The frequency higher than the audible range is called ultrasonic sound.

2. Wavelength : It is the time duration of one complete cycle. It consists of one positive and one negative phase.
3. Pitch : It is physiological property, which allows note in the scale from low to high and expressed in cycles per second (Hz). Faster the rate of vibration, higher the pitch is.
4. Intensity : It measures the loudness of sound.
5. Loudness : It is the physical property of intensity of sound. Its unit is called decibel, which is 1/10 of a bel, the unit called after Graham Bell who invented the telephone.

(Graham Bell was teacher in phonetics and his efforts to transmit intelligible speech to the deaf and mute by the aid of electricity led to his invention of the telephone in 1876 and eventually to the development by others of the electric hearing aid and the audiometer.)

The Transformer Mechanism of the Middle Ear : The acoustic energy is collected by the tympanic membrane and is transmitted through malleus, incus and stapes to the small area of footplate of stapes. The effective ratio is 14:1 of these areas. The three ossicles malleus, incus and stapes have their own lever mechanism, which has mechanical advantage of 1.3:1. The combined effect of these two is 18:1, which is the transformer ratio of this mechanism.

The Theories of Hearing :

1. Helmholtz Theory : The perception of pitch of sound depends upon selective maximal vibration action along the basilar membrane.
2. Rutherford's Telephone Theory : Perilymph and basilar membrane are stimulated by every frequency of sound like diaphragm of telephone. (the frequency theory).
3. Wever's Volley Theory : The higher frequencies (above 5000 Hz) stimulate the hair cells in the basal turn only while low frequencies stimulate the entire organ of corti.
4. The Travelling Wave Theory of Bekesy : This is the most commonly accepted theory. The travelling wave of sound reacts differently with different frequencies at cochlea. The higher frequency at the basal coil of cochlea and low frequency (below 1000Hz) at the apical side of cochlea.

AUDIOLOGY ROOM

The audiometric room should be in the quiet surrounding. There should be two chambers in the room separated by a transparent glass so that audiologist can observe the patient. There should be split A.C. in the room with duct system so that A.C. noise does not interfere with the testing. It should be sound treated room means neither the sound from outside the room nor the sound within the room should interfere with testing. And for this, the outside wall should be heavy and of hard surface to keep the outside room sound away and inside wall should be lined by absorptive material to keep reverberation low. The reflection on hard walls and absorption in loose material control the acoustic property of the room. The walls covered with absorptive material 'deaden' a room. The ideal audiology room should have proper balance between the reflection and absorption.

PURE TONE AUDIOMETRY

This is the most common technique used for hearing assessment. Pure tones are delivered to the ear through headphones for air conduction and by bone vibrator for bone conduction. Hearing level in decibel above the normal threshold is plotted. The frequency tested usually range from 250 to 8000 Hz.

Symbols for Plotting : The right ear curve is recorded in red colour and left ear curve with blue colour.

Air Conduction-Earphones	Left Ear	Right Ear
Unmasked	X	O
Masked	□	Δ
Bone Conduction-Mastoid	Left Ear	Right Ear
Unmasked	>	<
Masked]	[

Masking : Masking is done to prevent the hearing from the normal ear while testing the deaf ear. It occurs due to the crossover of sound from testing ear to the normal ear. Hood's plateau method of masking provides ideal masking. Masking can also be provided by Barany noise box. In OPD, rough masking effect can be produced by the rustling sound of paper but it is not very accurate method.

Interpretation of Audiograms : The pure tone average, is the average of the hearing threshold levels at 500, 1000 and 2000 Hz only. The deafness can be graded into several categories by air conduction threshold.

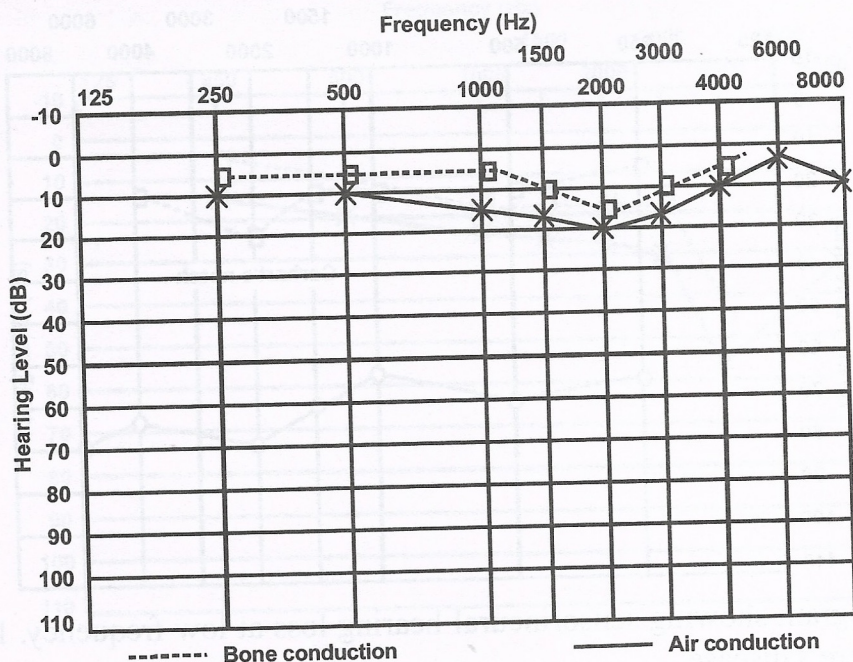
- 10 to 15 - Normal hearing
- 16 to 25 - Minimal hearing loss
- 26 to 40 dB - Mild deafness
- 41 to 55 dB - Moderate deafness
- 56 to 70 dB - Moderately Severe deafness
- 71 to 90 dB - Severe deafness
- Above 90 dB - Profound deafness

Types of Deafness :

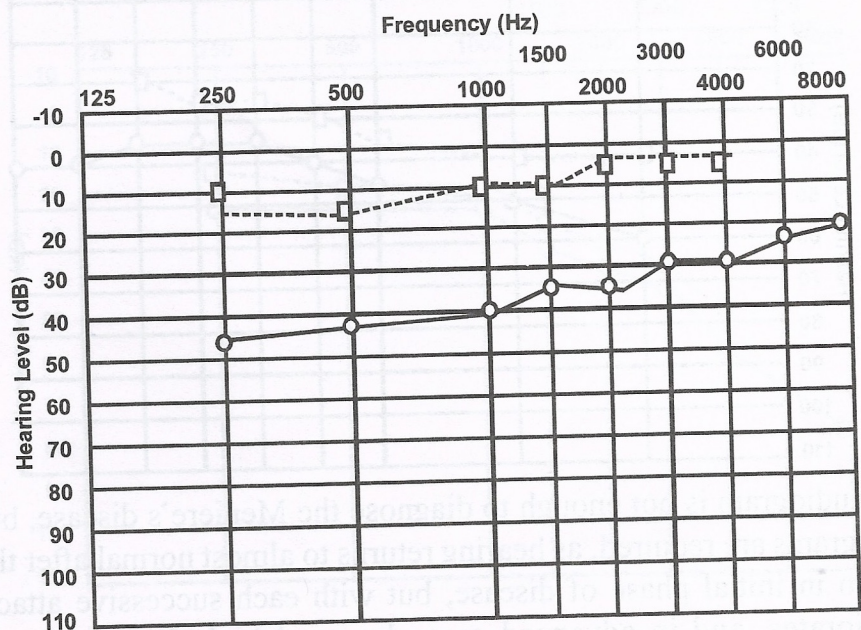
- Conductive Deafness : If bone conduction is normal but air-bone gap is 20 dB or more.
- Sensorineural Deafness : If bone conduction is more than 20 dB and air-bone gap is 10 dB or less.
- Mixed Deafness : If bone conduction is more than 20 dB and the air-bone gap is 10 dB or more.

AUDIOGRAMS

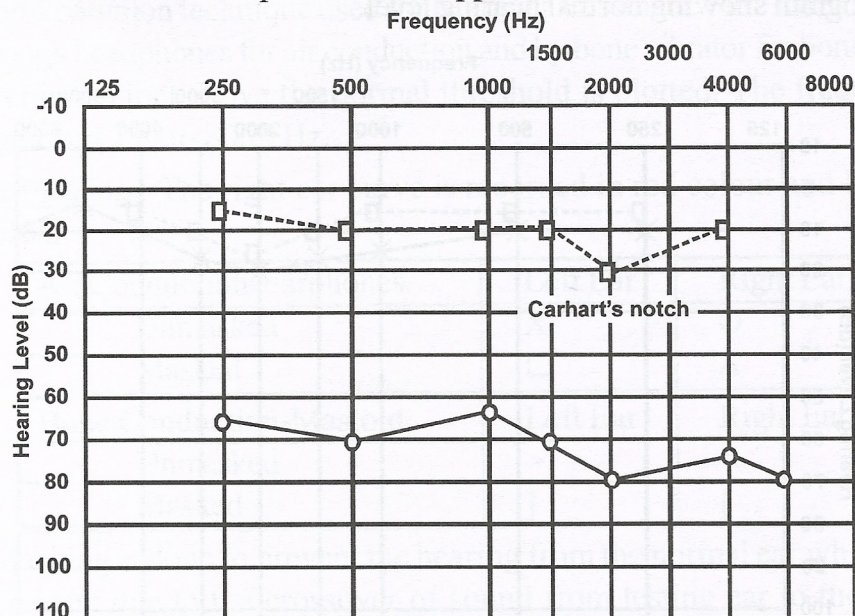
1. Audiogram showing normal hearing level.



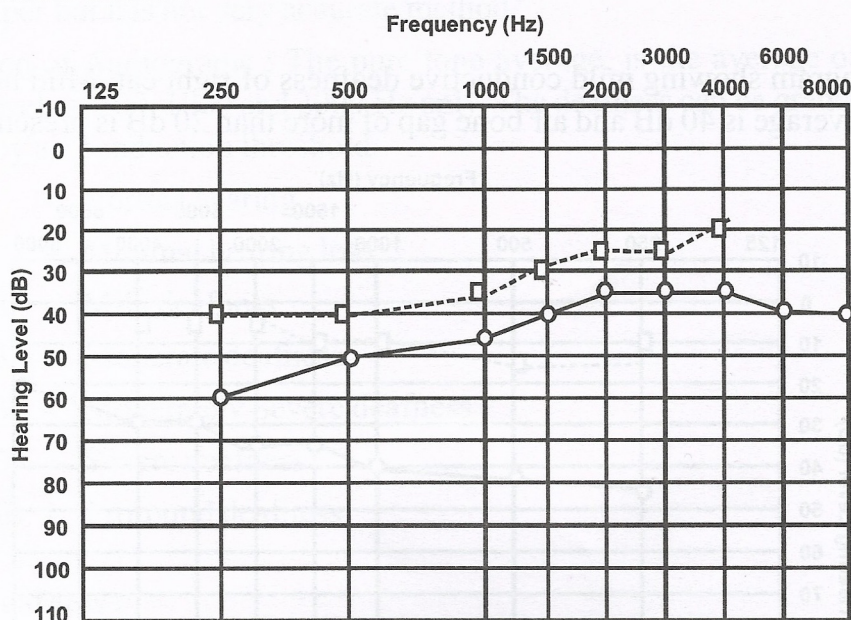
2. Audiogram showing mild conductive deafness of right ear. Mild because pure tone average is 40 dB and air bone gap of more than 20 dB is present.



3. Audiogram showing Carhart's notch at 2000Hz. Carhart's notch is due to loss of ossicular inertia component. It disappears after the successful stapedectomy.

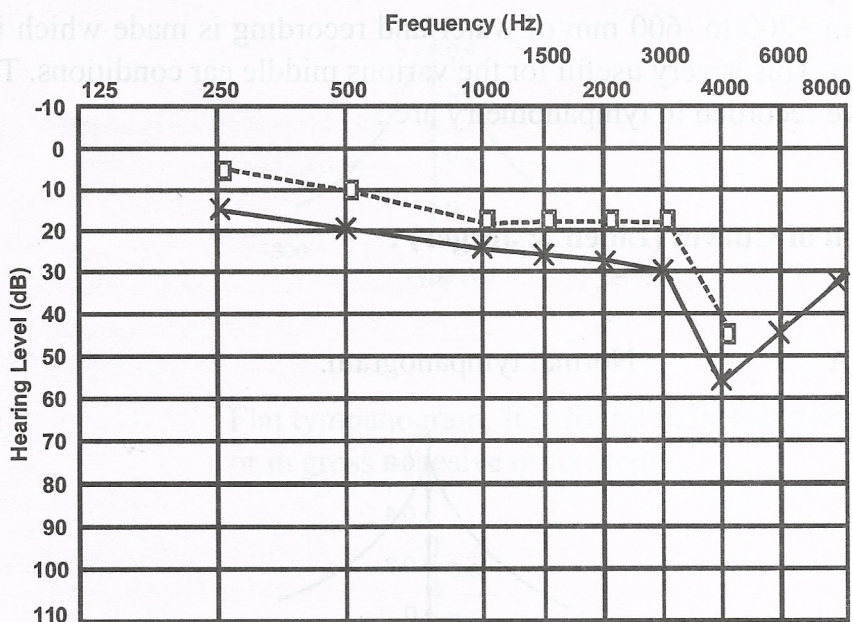


4. Audiogram showing sensorineural hearing loss at low frequency. It occurs in Meniere's disease.

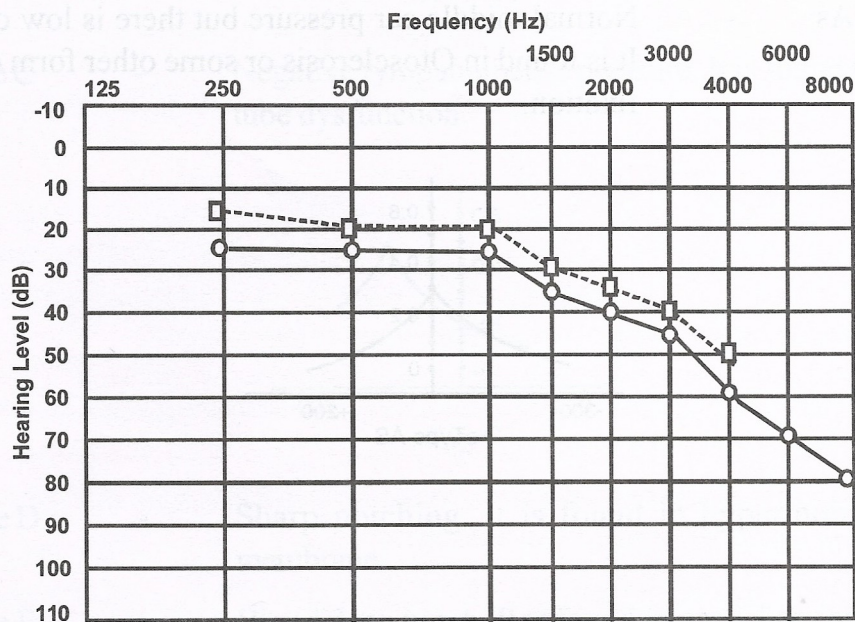


One audiogram is not enough to diagnose the Meniere's disease, but series of audiograms are required, as hearing returns to almost normal after the attack of vertigo in initial phase of disease, but with each successive attacks hearing deteriorates, and in advanced cases low and high frequencies both show sensorineural hearing loss.

5. Audiogram showing deafness at 4000Hz. It occurs in noise induced hearing loss.



6. Audiogram showing sloping high frequency sensorineural hearing loss. It occurs in presbycusis.

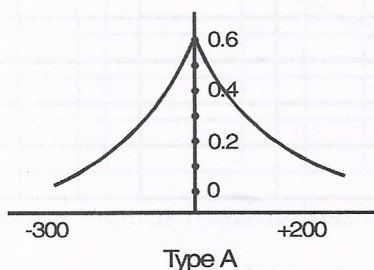


TYMPANOMETRY

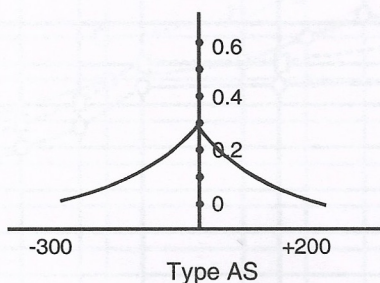
It records the pressure in the middle ear. The air pressure in the external auditory canal is varied from +200 to -600 mm of water and recording is made which is known as tympanogram. This is very useful for the various middle ear conditions. The different types of curve recorded in tympanometry are :

Classification of Curves (Liden & Jerger) :

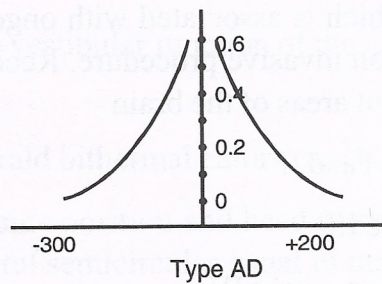
- Type A - Normal tympanogram.



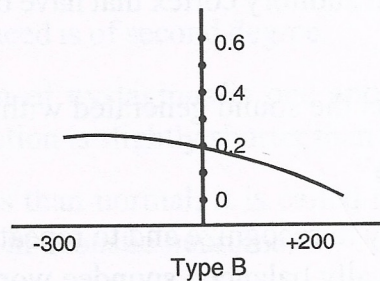
- Type As - Normal middle ear pressure but there is low compliance. It is found in Otosclerosis or some other form of ossicular fixation.



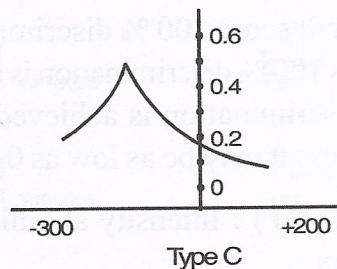
- **Type Ad** - Unusual high peak. It is found in ossicular abnormality.



- **Type B** - Flat tympanogram. It is found in secretory otitis media or in gross adhesive otitis media.



- **Type C** - Negative tympanometric pressure. It is found in eustachian tube dysfunction.



- **Type D** - Sharp notching. It is found in hypermobile tympanic membrane.
- **Type E** - Broad deep notch. It is found in partial or complete ossicular discontinuity.

BERA (Brain Evoked Response Audiometry)

BERA is screening test used in Retrocochlear pathology. It is the measurement of Auditory Evoked Potential which is associated with ongoing electrical activity uptill brain stem. It is completely non invasive procedure. Recordings are in form of seven waves arising from the different areas of the brain

1. Cochlear nerve - waves I and II
2. Cochlear nucleus - wave III
3. Superior Olivary complex - wave IV
4. Nuclei of lateral Lemniscus - wave V
5. Inferior Colliculus - waves VI and VII

CERA (Cortical Evoked Response Audiometry) is objective test of hearing involves recording of signals in auditory cortex that have been generated in response to sounds introduced into ears.

Otoacoustic emissions - It is the sound generated within inner ear

SPEECH AUDIOMETRY

It measures the patient's ability to recognize and to repeat correctly lists of words that are presented to him. Phonetically balanced spondee words are delivered at different intensities and patient is asked to repeat which is recorded in percentage.

(Spondee is a word with two syllables, both pronounced with equal stress and effort like tooth brush, aeroplane, sunset, farewell).

A person with normal hearing will score 100 % discrimination with sound intensity of 45-55 dB. In conductive deafness 100 % discrimination is achieved but at higher intensity. In sensory deafness 50-70% discrimination is achieved at low intensity and there is recruitment, but in neural deafness it may be as low as 0-20%.

Speech Reception Threshold (SRT) : Intensity at which patient is able to correctly repeat 50% of the words he hears.

Speech Detection Threshold (SDT) : It is the intensity at which the patient can hear 50% words without understanding them.

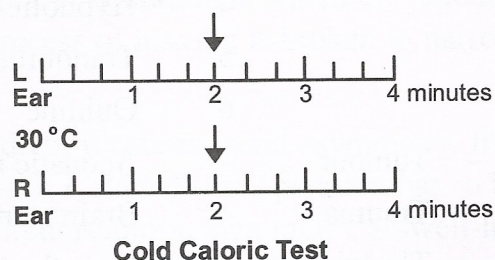
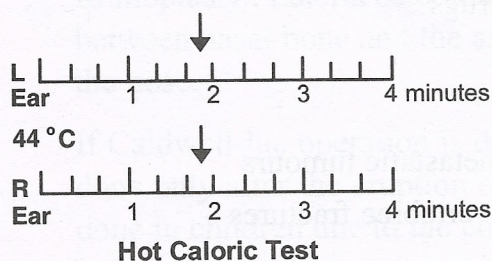
Speech Discrimination Score (SDS) : It is the percentage of correctly identified words from phonetically balanced words (monosyllabic words like age, as, can) presented to the patient. Normal ear : The SDS is normally between 90% to 100%. Conductive deafness : It is 90% to 100% but at high intensity. Retrocochlear lesion : It is very poor.

CALORIMETRY

This test is done to know the vestibular function of the ear.

Methods : (Hallpike-Fitzgerald bithermal caloric test)

- (i) Patient lies in the supine position and head raised to 30° above the horizontal, which brings the lateral semicircular canal in the vertical position.
 - (ii) The ear is irrigated using 250 to 500 ml of water at 7° above the body temperature i.e. 44° and 7° below the body temperature i.e. 30° .
 - (iii) The irrigation is continued for 40 seconds.
 - (iv) Patient is asked to look straight and the duration of nystagmus is recorded.
 - (v) The nystagmus produced is of second degree.
 - (vi) The average duration of nystagmus is one and half minute to two and half minutes. The hot reaction is slightly shorter than the cold.
- If the response is less than normal, it is called reduced response. It occurs in Meniere's disease or in acoustic neuroma.
 - The increased response is seen in cerebellar and brainstem lesions.
 - Some times nystagmus is more marked in one direction, it is called directional preponderance.



The types of caloric tests are :

1. Hallpike-Fitzgerald Bithermal Caloric Test : This is the most reliable caloric test as each ear is irrigated separately and it gives maximum information of individual ear separately.
2. Kobrak Method : 10-50 ml of iced water is introduced in the external auditory canal and the nystagmus is observed by the Frenzel's glass.

3. The Minimal Caloric Test : The patient extends his neck backwards by 60° and 10 ml of cold tap water is filled in the meatus and nystagmus is observed with the Frenzel's glass.
4. Linthicum Test : 0.2 ml of iced water is instilled with tuberculine syringe for 20 seconds to observe the nystagmus.
5. Dundas Grant Air Caloric Test : Most convenient test to exclude the dead ear in presence of tympanic membrane perforation. In this air caloric test, ethyl chloride is sprayed over the coiled copper tube while air is pumped into the ear.

VERTIGO

Causes : (1) Central (2) Peripheral

Central Vertigo : The formula is 'VERTIGO'

V - Vascular	1. Stroke-cerebral, brain stem, cerebellar
	2. Vertebrobasilar insufficiency
	3. Migraine
E - Epilepsy	
R - Rx	1. Antibiotics - Streptomycin, Kanamycin
	2. Cardiac drugs
	3. Antihypertensive
	4. Hypnotic-Sedative drugs
	5. Tranquillizers
	6. Quinine
T - Tumour	- Acoustic neuroma, metastatic tumours
Trauma	- Brain stem, cervical vertebrae fractures
Thyroid	- Hypothyroidism
I - Infection	- Viral, vestibular neuronitis
G - Glial diseases-	Multiple sclerosis
O - Ocular	

Peripheral Vertigo : Meniere's disease (endolymphatic hydrops), labyrinthitis, vestibular neuropathy, BPPV (Benign Paroxysmal Positional Vertigo)

APPLIED ANATOMY OF BONES

MAXILLA

The operations performed on this bone are :

1. Antral puncture wash out (APW)
2. Turbinectomy
3. Caldwell-luc operation
4. Total maxillectomy
5. Subtotal and medial maxillectomy
6. Alveolectomy
7. FESS
8. As an approach to -
 - (a) Pterygopalatine fossa (Golding-Wood approach) for the maxillary artery ligation and vidian neurectomy.
 - (b) Provide support to the floor of orbit in fracture of the floor of orbit.
 - (c) Transantral ethmoidectomy.
 - (d) Sphenoid sinus and pituitary gland for hypophysectomy.
9. Rhinoplasty : Lateral osteotomy in rhinoplasty operation in which the junction between nasal bone and the ascending process of maxilla is broken to narrow the nose.

If Caldwell-luc operation is done in children, it causes facial asymmetry. It is done only after the eruption of last molar. If Caldwell-luc operation has to be done in children due to the compelling circumstances, then mini Caldwell-luc is to be done where opening is made higher up. The floor of maxillary antrum lies 1.25 cm. below the floor of nasal cavity. In edentulous patient the floor of antrum is at the same level as of nasal cavity, so only intranasal antrostomy is sufficient instead of Caldwell-luc operation. (Caldwell of U.S. first did this operation; Henry luc of Paris popularised it, hence Caldwell-luc name got attached).

- The modifications of Caldwell-luc operations are :
- Canfield's operation-Intranasal incision is given just below the vestibule.
 - Denker's operation- The incision of Caldwell-luc is carried further medially so that nasal cavity is also exposed as well as canine fossa.
 - McNeil operation - Obliteration of maxillary sinus.

TEMPORAL BONE

It is the only bone of the body which contains three bones inside named :

(1) Malleus, (2) Incus, (3) Stapes

(Stapes is the smallest bone of body and Femur is the largest bone)

- The operations performed on this bone are :
1. Cortical, Radical and Modified radical mastoidectomy
 2. Tympanoplasty
 3. Petrosectomy
 4. Facial nerve decompression
 5. Styloidectomy - enlarged styloid process causing styalgia or glossopharyngeal neuralgia
 6. Cochlear implant surgery
 7. Inner ear decompression in Meniere's disease

The important surgical landmarks :

1. Macewen's Triangle (Supra-Meatal Triangle) :

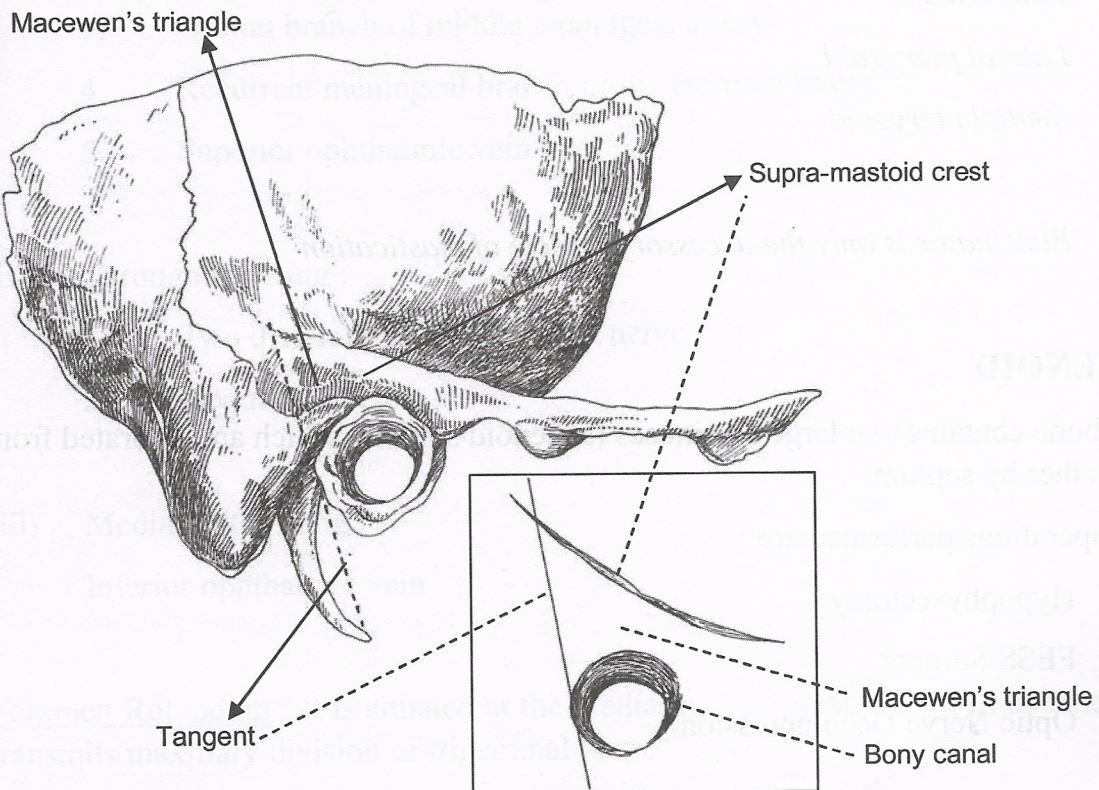
This triangle is formed superiorly by the supra-mastoid crest, anteriorly by the posterior external auditory canal and posteriorly by the vertical tangent drawn at posterior wall of external auditory canal.

(Tangent is the line which touches the circle at one point.)

The mastoid antrum lies 1.25 cm. deep to it.

(Sir William Macewen was a general surgeon and Macewen's triangle is the acknowledged anatomical landmark of the mastoid antrum.)

2. Supra-Meatal Spine (Spine of Henle) - It is important landmark for starting drilling in mastoid surgery as mastoid antrum lies posterior and superior to it.
3. Mastoid Process - is not developed before 2 years of age so in mastoid surgery the classical post-aural Wilde's incision is not given, as facial nerve is superficial and may be damaged, rather almost horizontal incision is given.
4. Mastoid Antrum - is an air chamber communicating with tympanic cavity anteriorly through aditus. The lateral wall is formed by the squamous part of temporal bone. Medial wall is formed by the petrous part of temporal bone and posterior and lateral semicircular canal lies in this relation. The roof of mastoid cavity is formed by tegmen antri, which separates it from the middle cranial fossa. The posterior wall and floor is formed by the mastoid portion of temporal bone.
5. Valley of the nerve - It is vaginomastoid angle where the vaginal process of the tympanic portion of the temporal bone meets the mastoid process. It is helpful surgical landmark for the facial nerve.



MANDIBLE

It is the largest and strongest bone of the face and form the lower jaw.

The operations performed on this bone are :

1. Hemi-mandibulectomy.
2. Segmental mandibulectomy
3. Commando operation
4. Alveolectomy
5. Mentoplasty
6. Condylectomy in temporo-mandibular joint ankylosis

The muscles of mastication are :

- *Masseter*
 - *Temporalis*
 - *Lateral pterygoid*
 - *Medial pterygoid*
-
- *Buccinator is only the accessory muscle of mastication*

SPHENOID

This bone contains two large air sinuses (sphenoid sinuses) which are separated from each other by septum.

The operations performed are :

1. Hypophysectomy
2. FESS Surgery
3. Optic Nerve Decompression

BASE OF SKULL

Olfactory Bulb and Tract : It transmits olfactory nerve.

Optic Foramen : It lies between the two roots of lesser wing of sphenoid. The structures passing through it are :

1. Optic nerve
2. Ophthalmic artery

Superior Orbital Fissure : It is divided by the annulus tendinous ring into 3 compartments. The following structures pass through this fissure :

(i) Lateral to Ring :

1. Frontal and lacrimal branches of ophthalmic nerve
2. Trochlear nerve
3. Orbital branch of middle meningeal artery
4. Recurrent meningeal branch of the lacrimal artery
5. Superior ophthalmic vein

(ii) Through the Ring :

1. Two divisions of oculomotor nerve
2. Abducent nerve

(iii) Medial to the Ring :

Inferior ophthalmic vein

Foramen Rotundum : It is situated at the medial part of greater wing of sphenoid. It transmits maxillary division of trigeminal nerve.

Foramen Lacerum : It transmits emissary vein.

Foramen Ovale : It is situated in the greater wing of sphenoid, behind and lateral to foramen rotundum. It transmits -

1. Mandibular division of trigeminal nerve
2. Lesser superficial petrosal nerve
3. Accessory meningeal artery and vein

Foramen Spinosum : It is situated in the posterior angle of sphenoid anteromedial to the sphenoidal spine. It transmits middle meningeal artery.

Internal Auditory Meatus : It transmits -

1. Facial nerve
2. Vestibulo-Cochlear nerve
3. Internal auditory artery and vein

Jugular Foramen : It transmits -

(i) Anterior compartment :

Inferior petrosal sinus communicating the cavernous sinus with internal jugular vein.

(ii) Middle compartment :

1. Glossopharyngeal nerve
2. Vagus nerve
3. Accessory nerve

(iii) Posterior compartment :

Sigmoid sinus is continued as superior bulb of internal jugular vein.

Hypoglossal Canal : Hypoglossal nerve

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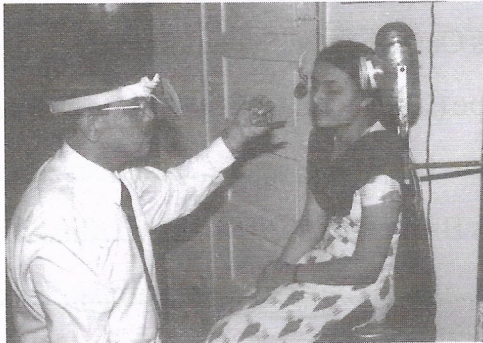
INSTRUMENTS

Bull's Eye Lamp

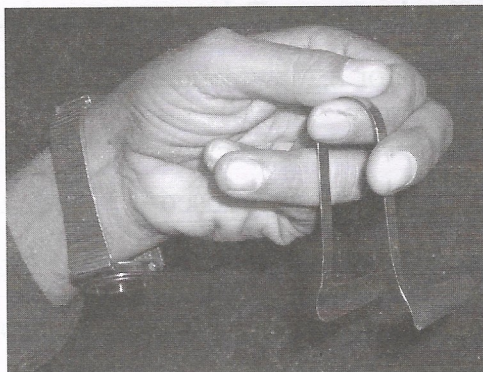
It has a planoconvex lens. It is fitted with bull's eye lens (the other name of planoconvex lens). A 100-watt white-frosted bulb is used for the illumination. It is kept on the left side of patient approx. 1 foot away from the patient at the level of pinna (to prevent the heat of bulb to the patient.). In earlier time it was known as Chiron Lamp.

Method of Examination

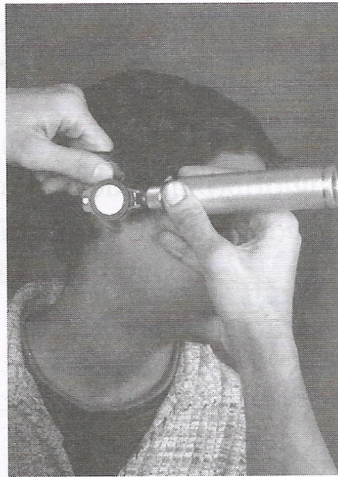
The patient should sit very erect with his head 10 to 12 inches forward from the back of the chair. While examining the patient, surgeon's both legs should be together on the right side so that patient can walk to the examination place and sit down on the stool without doctor changing his position and legs. The two legs apart of the doctor for the purpose of examination of the patient is not appropriate position. For the examination of ear - light should be focused at the tragus and for anterior rhinoscopy - light should be focused at the columella.



For anterior rhinoscopic examination, hold the Thudicum's nasal speculum as shown in picture.



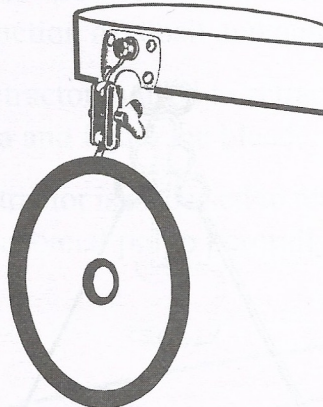
For otoscopic examination of the right ear, pull the pinna with the left hand. Hold the otoscope with right hand with little fingers resting on the cheek of the patient, so that if the patient moves the head otoscope also moves alongwith the ear without causing pain to the patient.



Forehead Mirror

It is concave mirror.

Remember the formula of 9, 9, 2. Focal length of mirror is 9 inches, diameter of mirror is 9 cm. and diameter of hole is 2 cm. The hole lies in front of the right eye to visualise the structures to be examined while left eye is kept open for the binocular vision. The binocular vision provides the depth in vision.

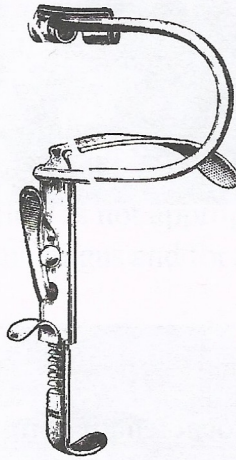


INSTRUMENTS FOR TONSIL AND THROAT

1. Boyle-Davis' Mouth Gag with Tongue Depressor

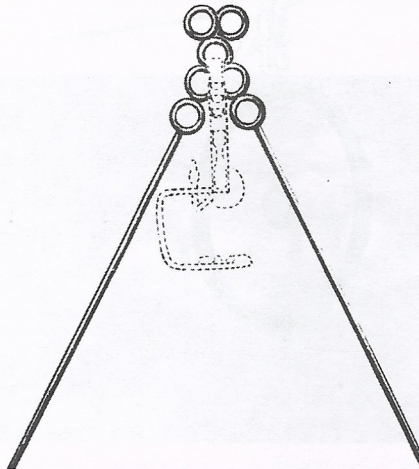
It has Boyle's blade and Davis gag to be used together.

1. It is used for tonsillectomy.
2. Also used for operations of palate and nasopharynx like juvenile nasopharyngeal angiofibroma, adenoid removal, and cleft palate repair.



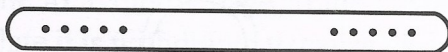
2. Draffin's Bipod Metallic Stand

It has four rings for varying height. It is used to fix the Boyle Davis' mouth gag.



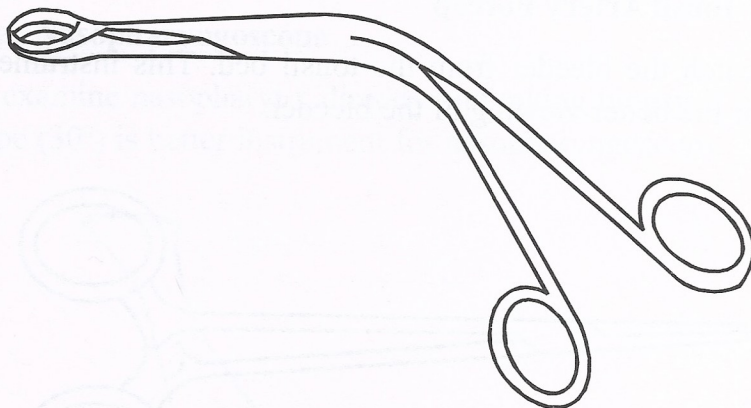
3. Magauran's Plate

It is used to hold Draffin's Bipod Metallic stand.



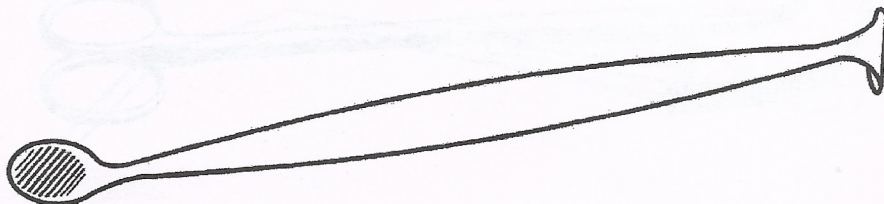
4. Denis Browne's Tonsil Holding Forcep

Used to hold the tonsil during tonsillectomy. It is also used for removing antrochoanal polyp and for removing thick mucosa in Caldwell-luc operation.



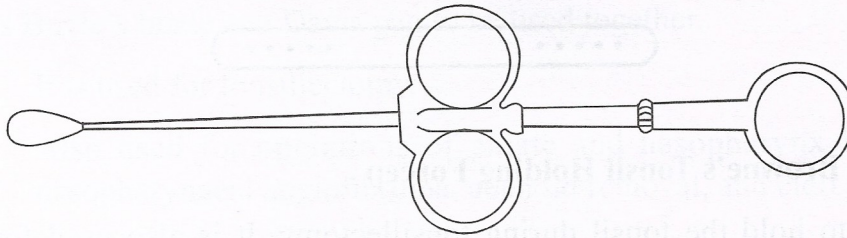
5. Mollison's Tonsil Dissector with Anterior Pillar Retractor

1. Tonsil dissector is used to dissect the tonsil after giving incision on mucosa at the junction of tonsil and anterior pillar.
2. Anterior pillar retractor is used to retract the anterior pillar to visualise the tonsillar fossa and ligate the bleeders after the tonsillectomy.
3. Anterior pillar retractor is also used to retract the uvula and palate during removal of antrochoanal polyp perorally.

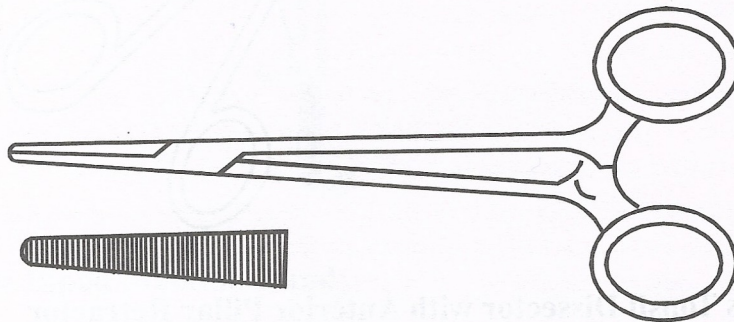


6. Eve's Tonsillar Snare

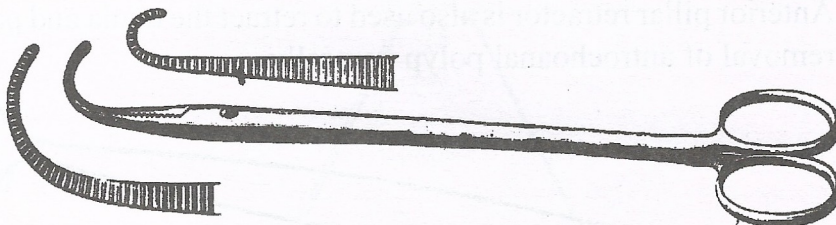
Its function is to crush and cut. The tonsil has muscle attached at the lower pole. By the action of crushing and cutting, bleeding is less at the lower pole.

**7. Burkitt's Tonsil Artery Forcep**

Used to catch the bleeder from the tonsil bed. This instrument is long and slender for the better viewing of the bleeder.

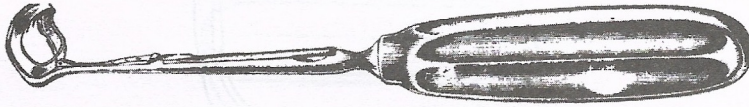
**8. Negus' Curved Tonsil Artery Forcep**

It is useful to tie the ligature at the depth. The ligature will not slip due to its curved tip.

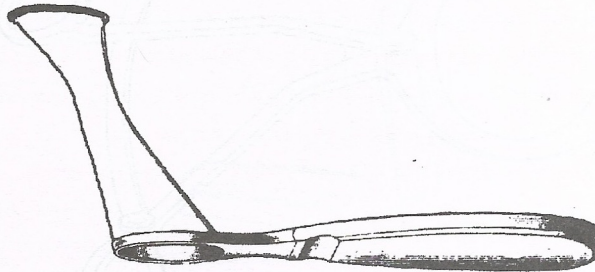


9. St. Clair Thomson's Adenoid Curette with Cage

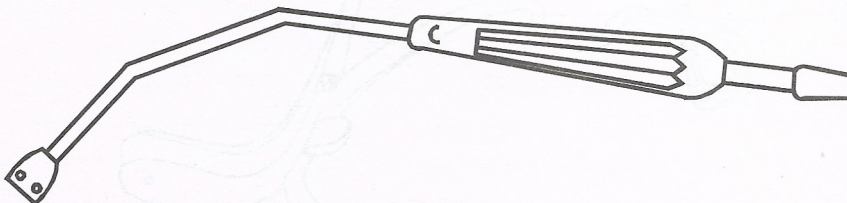
Adenoid curette is used to shave off the adenoid from the nasopharynx and the cage prevents it from slipping. This instrument is to be held like a dagger and passed into nasopharynx. With firm pressure it is swept downwards remaining strictly in the midline to avoid damage to the eustachian tube. At the level of lower end of soft palate it is withdrawn to cause clean cut of the nasopharyngeal mucosa.

**10. Yankauer Nasopharyngoscope**

Used to examine nasopharynx directly and taking biopsy if necessary. Nasal endoscope (30°) is better instrument for nasopharyngoscopy.

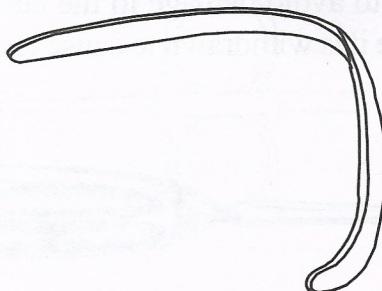
**11. Yankauer Pharyngeal Suction Tube**

Used in tonsillectomy, adenoidectomy and all the other operations of oropharynx and nasopharynx for the suction.

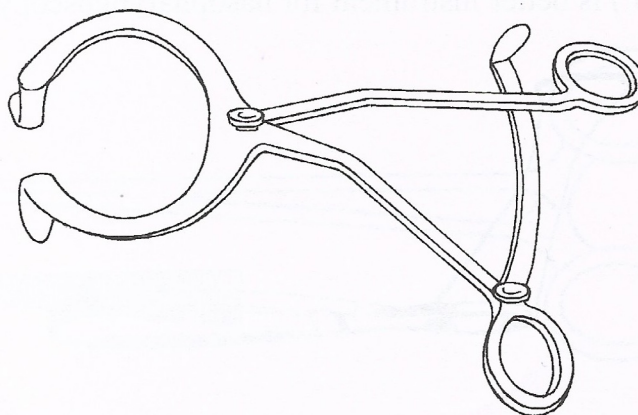


12. Lack's Tongue Depressor

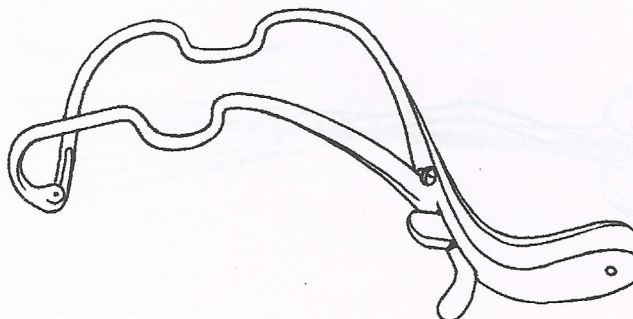
Used for the examination of oral cavity, performing posterior rhinoscopy, tonsillectomy under local anaesthesia, testing gag reflex, doing spatula test and for visualization of nasopharynx under anaesthesia by using the bent end.

**13. Doyen's Mouth Gag**

Used for operations of the oral cavity, oropharynx and nasopharynx like tongue-tie release, uvulectomy etc. It cannot be applied to edentulous patients.

**14. Jennings's Mouth Gag**

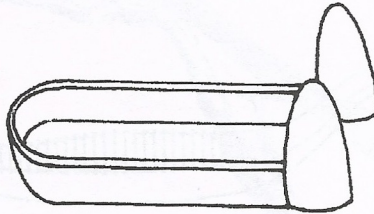
Uses are similar to that of Doyen's mouth gag. It does not damage the teeth and can be used in edentulous patients.



INSTRUMENTS FOR NASAL AND SINUS SURGERY

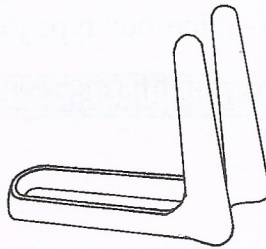
1. Thudicum's Nasal Speculum

It is used for anterior rhinoscopy.



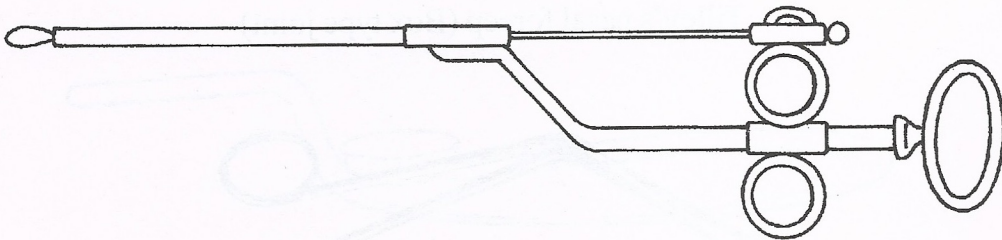
2. St.Clair Thomson's Long Bladed Nasal Speculum

It is used for visualising the deeper part of nasal cavity in surgeries like septoplasty and in S.M.R. operation for retracting mucoperichondrial flaps.



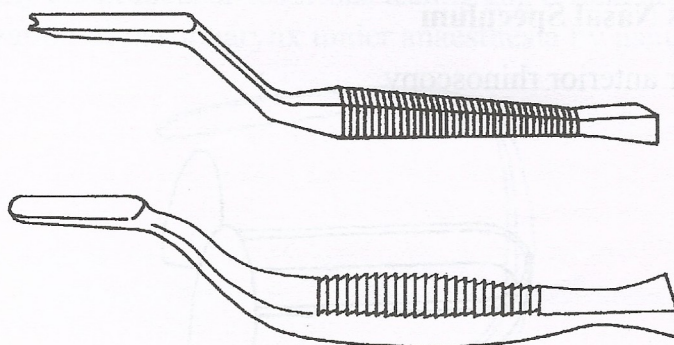
3. Glegg's Nasal Snare

It is used for avulsion of polyp in nasal polypectomy. Its size is smaller than tonsillar snare but bigger than ear snare.



4. Killian Gouge

It is bayonet shaped and used for removing maxillary crest in septoplasty.

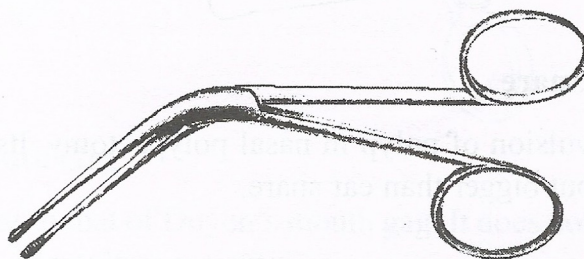


5. Nasal Dressing Forceps

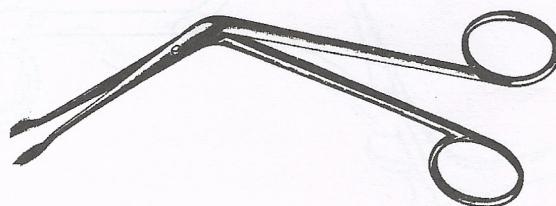
It is used for the packing of nasal cavity.

There are two types of nasal dressing forceps :

1. Tilley's nasal forcep - it has box type joint
2. Hartman's nasal forcep - it has screw type joint. The jaw are serrated and grooved.



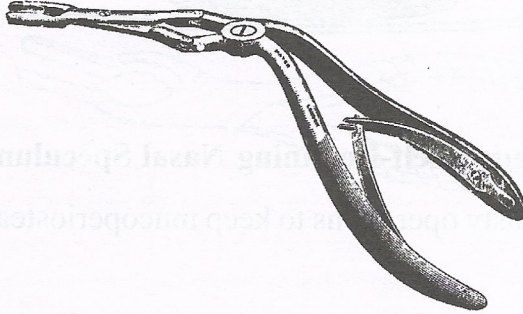
Tilley's nasal forcep (Box type joint)



Hartman's nasal forcep (Screw type joint, serrated & grooved jaw)

6. Jansen Middleton's Double Action Bone Nibbling Forcep

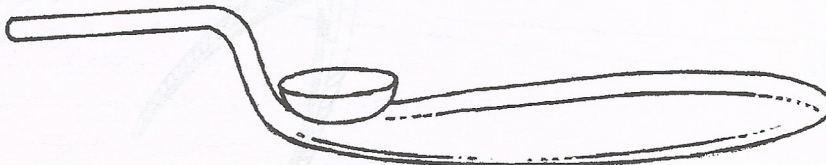
It is used for removing ethmoid and vomer bones in septoplasty. It is called double action as this instrument has 4 joints with double lever system to allow the blades to open and close to limited extent.

**7. Freer's Elevator**

It is used to elevate mucoperichondrial flap in septoplasty.

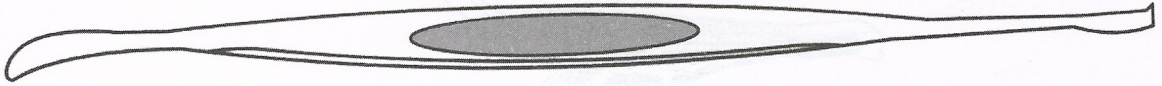
**8. Killian Elevator**

It has a flat medial surface for the nasal septum and lateral convex surface for elevating the mucoperiosteal and mucoperichondrial flaps. The convex surface prevents the tear of the flaps. It is bayonet shaped so surgeon's hand does not obstruct the field of surgery. The left and right side instruments are separate.

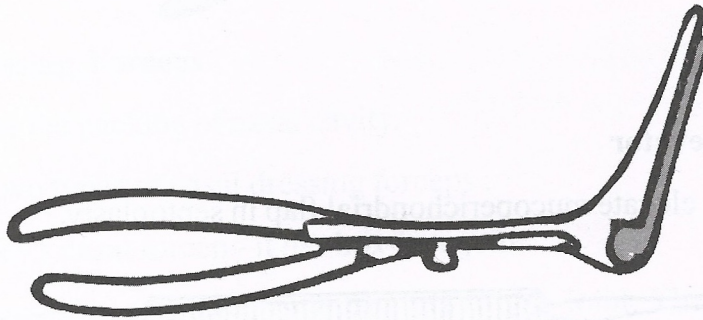


9. Howarth Nasal Raspatory

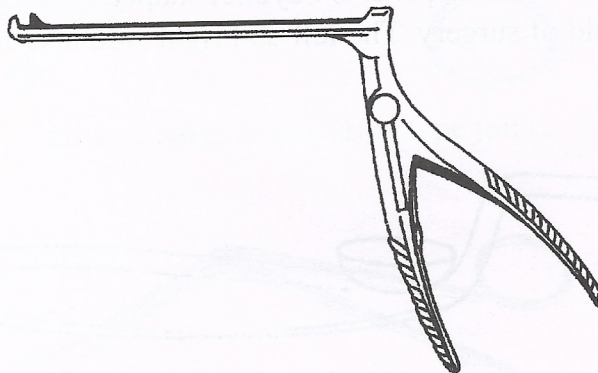
It is used for elevating the mucoperichondrium flap in Septoplasty.

**10. Killian's Long Bladed Self-Retaining Nasal Speculum**

It is used in septoplasty operations to keep mucoperiosteal flaps away.

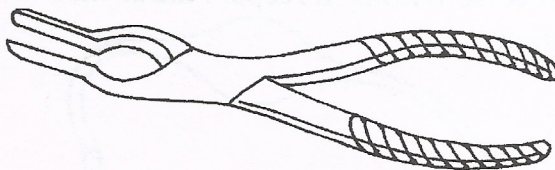
**11. Citelli Punch Forceps**

Used in Caldwell-luc operation for enlarging the opening in the antrum. Bleeding from bone is much less with this instrument.

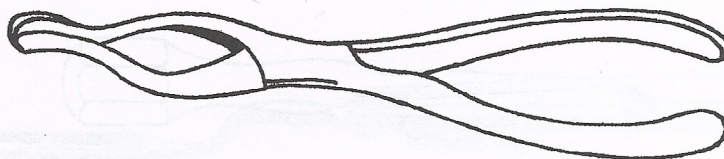


12. Asch's Forceps

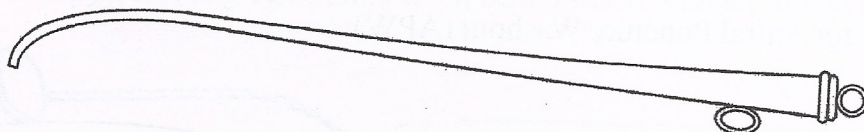
Used for lifting the septum upwards during reduction of fracture of nasal bones. When the two blades are closed, there is gap between the two blades to prevent the crushing of nasal septum. This forcep is angled so easy to remember, A for Asch's.

**13. Walsham's Forceps**

It is used in for disimpacting the fracture in the reduction of fracture of nasal bones. It has a rubber tube covering on one blade for the protection of skin of the external nose. It is straight so should not be confused with the Asch's forcep.

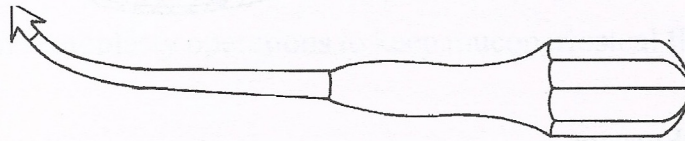
**14. Woake's Eustachian Catheter**

Used to catheterise the eustachian tube. The ring indicates the direction of tip.

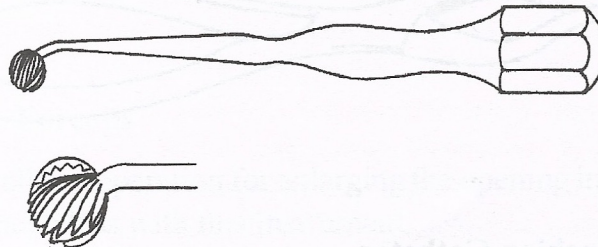


15. Tilley's Antral Harpoon

Used for making intranasal antrostomy in inferior meatus in Caldwell-luc operation. Now the concept of antrostomy is changing as it has been found that cilia continue to beat towards the natural ostium and not towards the antrostomy opening. In FESS surgery the natural opening of maxillary antrum is widened with Ostrum's reverse cutting forceps. Antral mucosa returns to the normal with proper aeration.

**16. Tilley's Antral Rosette Burr**

Used to smoothen the edges of intra nasal antrostomy in Caldwell-luc operation. If we do not smoothen the edges there may be premature closure of antrostomy.

**17. Tilley-Lichtwitz Trocar and Cannula**

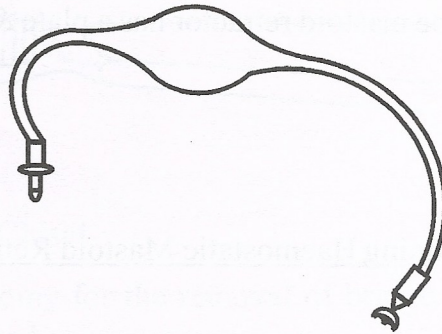
Used for Antral Puncture Washout (APW)



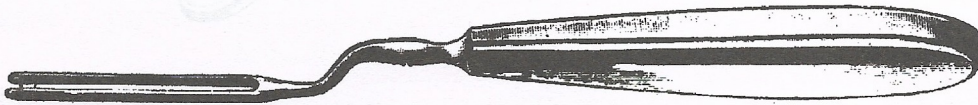
18. Higginson's Rubber Syringe

Used in antral washout. Its capacity is 30 ml.

Normal saline is used for antral washout as it is isotonic with body fluids and does not interfere with ciliary movement.

**19. Ballenger's Swivel Knife**

Used in SMR surgery. Nowadays not used and is only of historic value.

**20. St. Clair Thomson's Posterior Rhinoscopic Mirror**

Used for examining the posterior part of nose and nasopharynx (posterior rhinoscopy). It is angled so should not be confused with laryngeal mirror.

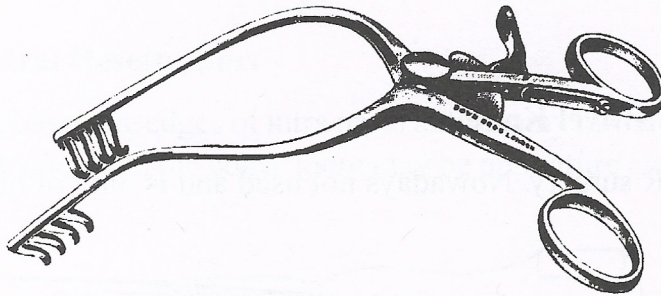


INSTRUMENTS FOR EAR SURGERY

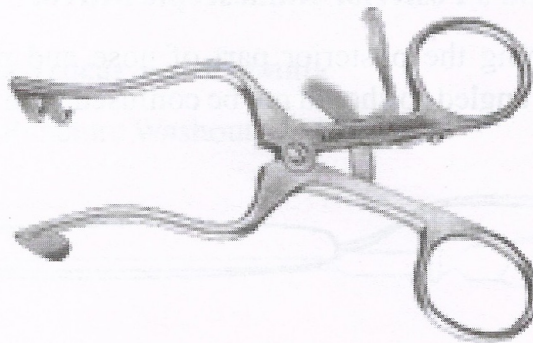
1. Mastoid Retractor

Used in mastoid surgery. It is self-retaining because it has a lock, and haemostatic because its blades control the bleeding by compressing the soft tissue after the incision. Plester's type mastoid retractor has a plate & more commonly used for tympanoplasty.

Mollison's Self-Retaining Haemostatic Mastoid Retractor



Plester -Jansen Self-Retaining Haemostatic Mastoid Retractor



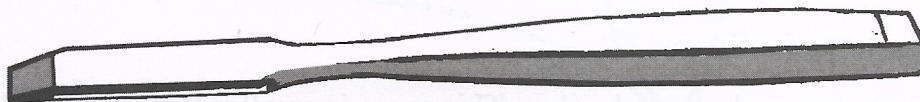
2. Farabeuf's Mastoid Periosteum Elevator

It is used to elevate the periosteum from the mastoid cortex in mastoidectomy and tympanoplasty. It has thumb rest for firm grip. It is also used in caldwel-luc operation for elevating periosteum.



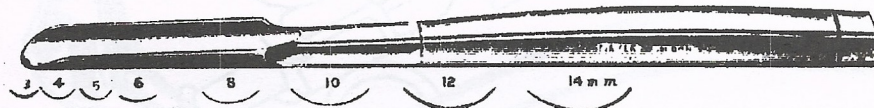
3. Jenkin's Mastoid Chisel

Used in mastoidectomy for the removal of bridge. Now a days micro-motor drill and burrs are used.



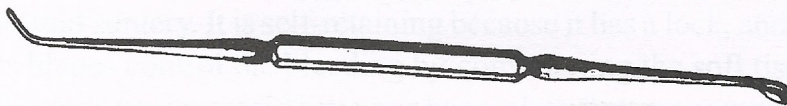
4. Jenkin's Mastoid Gouge

Used in mastoidectomy to exenterate the mastoid air cells and expose the mastoid antrum. Now a days micro-motor drill and burrs are used. Also used in Caldwell-Luc operation to open the maxillary antrum.



5. Macewen's Mastoid Curette and Cell Seeker

Used in mastoidectomy to curette the intervening septa. The cell seeker helps to identify aditus and explore the air cells.

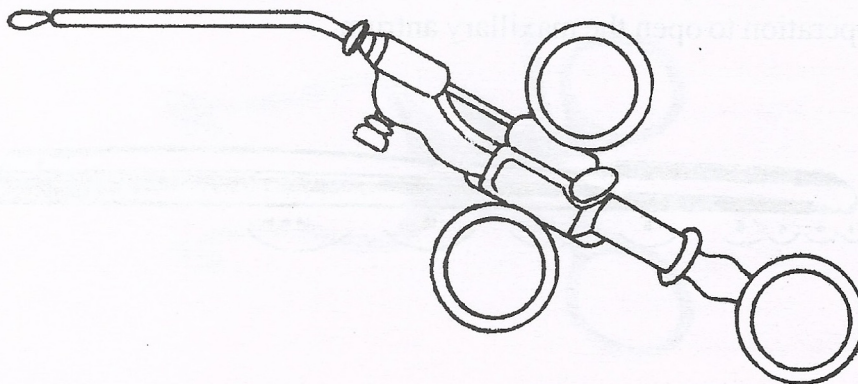
**6. Lempert's Mastoidectomy Curette**

Used in mastoidectomy to curette the mastoid air cell and expose the facial nerve if necessary.

**7. Glegg's Aural Snare**

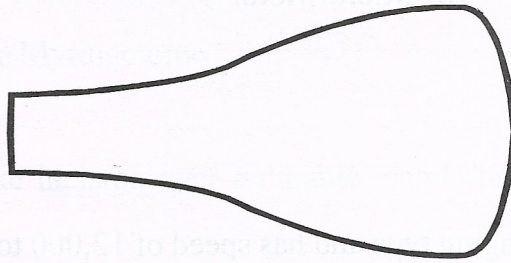
Used in removal of aural polyp. This snare is smaller than nasal and tonsillar snare. It fully cuts the polyp and does not avulse ear polyp as avulsion may cause removal of bone and that may open the inner ear.

The main difference between aural polypectomy and nasal polypectomy is that nasal polyp is avulsed while aural polyp is cut.

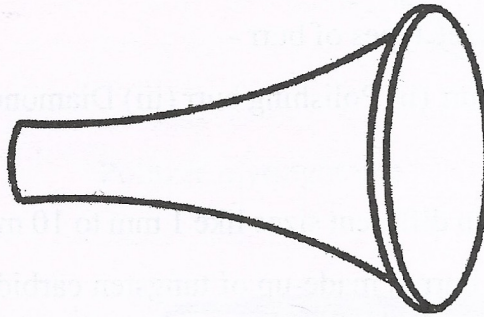


8. Metallic Ear Speculum

Used for the examination of external auditory canal and tympanic membrane.



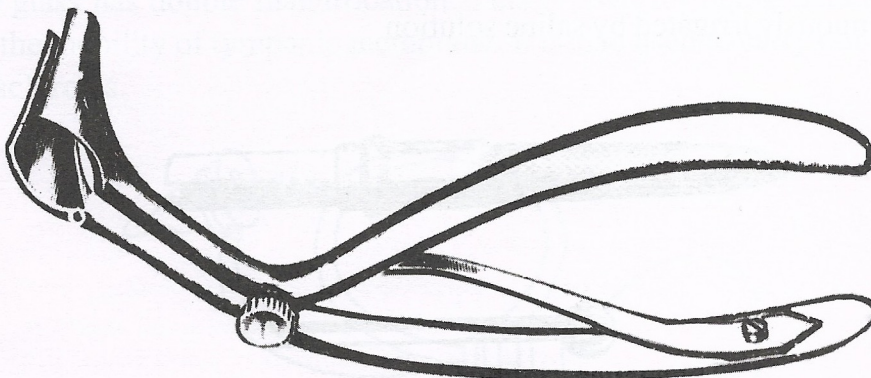
Grubber's ear speculum



Toynebee's ear speculum

9. Lempert's Endaural Speculum

Used for making endaural incision.



10. Drill with Burr

A drill consists of 3 parts :

- (1) (a) Motor (b) Micro-Motor
- (2) Hand Piece
- (3) Burrs

Motor : It is of hanging type and has speed of 12,000 to 20,000 rpm.

Micro-Motor : it is small and very handy. It has speed of 30,000 to 40,000 rpm.

Hand Piece : It may be straight or angled.

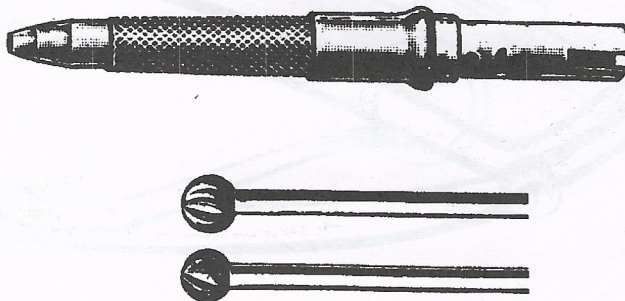
Burrs : There are three types of burr -

- (i) Cutting burr (ii) Polishing burr (iii) Diamond paste burr

They are available in different sizes like 1 mm to 10 mm.

- (i) The cutting burr is made-up of tungsten carbide and is used for cutting the bone in mastoidectomy.
- (ii) The polishing burr is used for smoothening the cavity after the mastoid surgery for good epithelisation.
- (iii) The diamond paste burrs are used near facial nerve, dura or sinus. It helps to control bleeding from bone by pushing the vessel down into its channel and filling the channel with bone dust.

The drilling generates lot of heat and to combat the operation field should be continuously irrigated by saline solution.

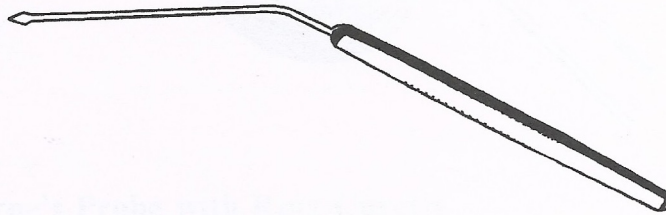


11. Myringotome

These are two types

- (1) Agnew (Politzer) Myringotome
- (2) Trautmann Myringotome

It is used to make incision over tympanic membrane in A.S.O.M., Secretory otitis media.



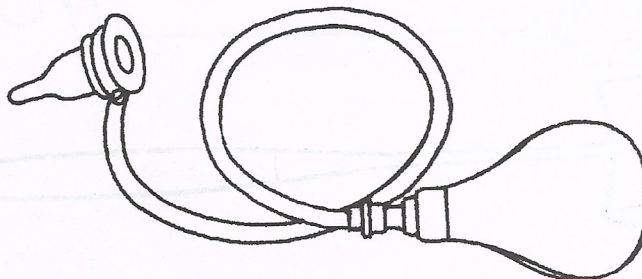
Politzer myringotome



Trautmann myringotome

12. Siegle's Pneumatic Ear Speculum

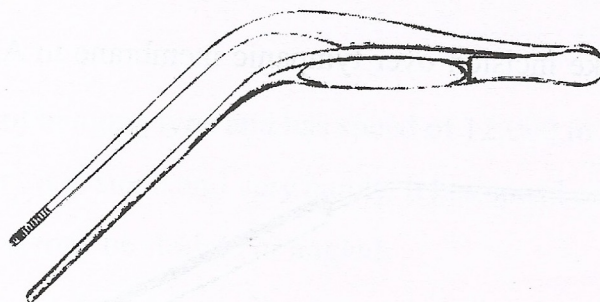
The glass has double magnification. This is used for doing fistula test and to see the mobility of tympanic membrane. It is also used to carry out Gelle test in otosclerosis.



13. Ear Dressing Forceps - Used for ear dressing

There are different types of ear dressing forceps :

- (1) Wilde Forcep
- (2) Fagge Forcep



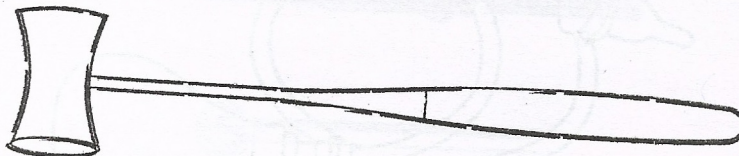
Wilde aural forcep



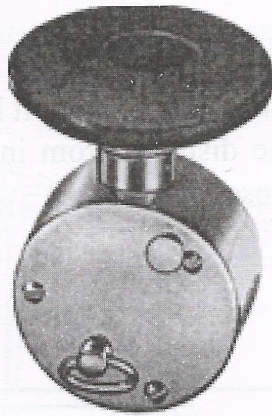
Fagge aural forcep

14. Godlee's Mallet

Used in mastoidectomy with chisel or gouge to remove bone.



15. Barany Noise instrument - Used for masking non-testing ear



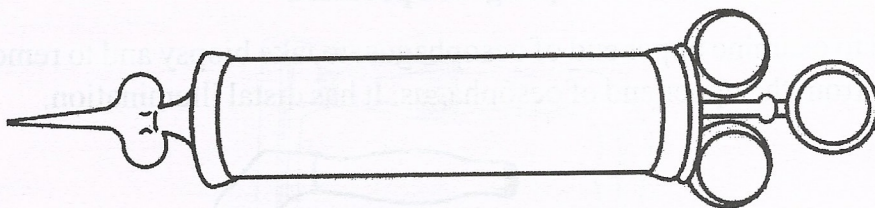
16. Jobson Horne's Probe with Ring Curette

Probe end is used with cotton swab to clean ear discharge. Curette is used for wax removal.



17. Aural Metallic Syringe

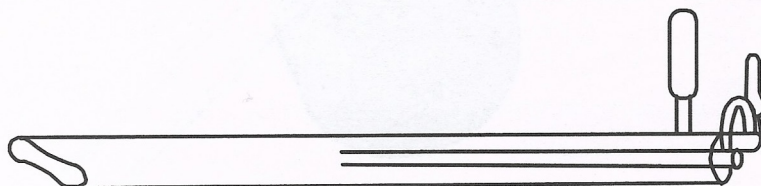
Used for the syringing of ear for the removal of wax and foreign body.



INSTRUMENTS FOR LARYNX, TRACHEA & OESOPHAGUS

1. Oesophagoscope (Negus)

In this instrument illumination is proximal. It has no holes at the tip. Markings are present to measure the distance from incisor teeth to know the site of pathology during oesophagoscopy.

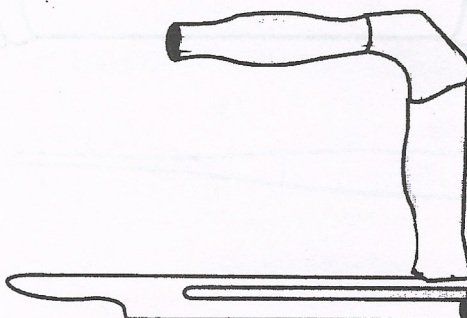


The length of oesophagus is 25 cm. and there are 4 normal constrictions in the oesophagus.

- I. The first constriction is the cricopharyngeal sphincter at the level of C6 vertebra and the distance from incisor teeth to cricopharynx is 15 cm.
- II. The second constriction is at crossing of aorta at the level of T4 vertebra and the distance from incisor teeth is 25 cm.
- III. The third constriction is at the bifurcation of trachea at the level of T5 vertebra and the distance from incisor teeth is 27 cm.
- IV. The fourth constriction is at the cardiac end of oesophagus at the level of T10 vertebra and the distance from the incisor teeth is 40 cm.

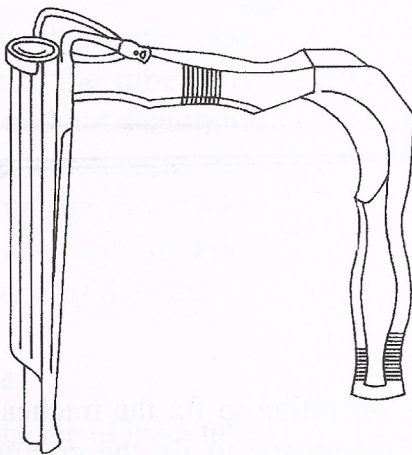
2. Chevalier Jackson's Oesophageal Speculum

Used to examine upper end of oesophagus, to take biopsy and to remove foreign body from the upper end of oesophagus. It has distal illumination.



3. Direct Laryngoscope (Chevalier Jackson's)

Used for direct visualisation of larynx. It is used for taking biopsy from the suspicious growths of larynx and removing foreign body and benign tumours like papilloma

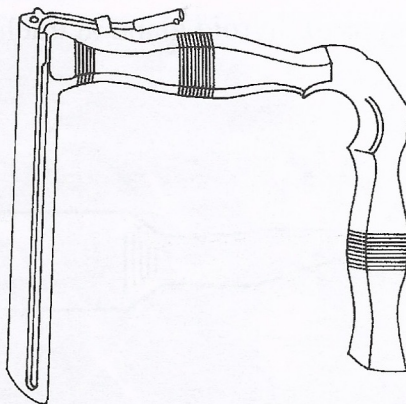


4. Anterior Commissure Laryngoscope

It has a bevelled tip, which visualizes the anterior commissure.

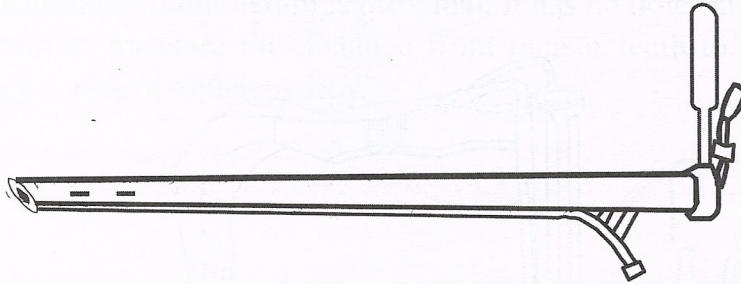
The structure not visualized on laryngoscopy is the under surface of vocal cords. Vestibule is the area, which is not seen unless examined by retracting the false cords (ventricular bands).

(The under surface of vocal cords can be examined by introducing the fibre optic laryngoscope upto the subglottic space and turning the tip to 90° backwards.)

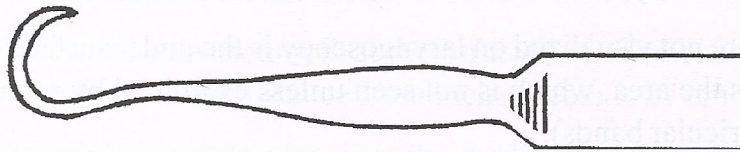


5. Chevalier Jackson's Bronchoscope (Rigid)

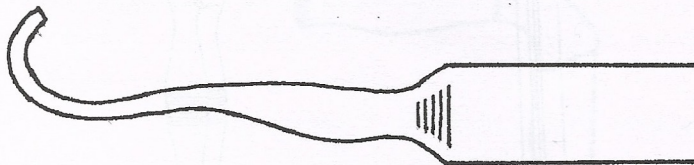
It has distal illumination. It has small holes at the lower end for the ventilation of bronchus, which differentiates it from oesophagoscope which has no vents.

**6. Cricoid Hook**

Used in tracheostomy operation to fix the trachea. The sharp edge is passed through cricotracheal membrane to fix the cricoid as trachea moves during respiration.

**7. Blunt Tracheal Hook**

Used to retract the isthmus of thyroid gland in tracheostomy.

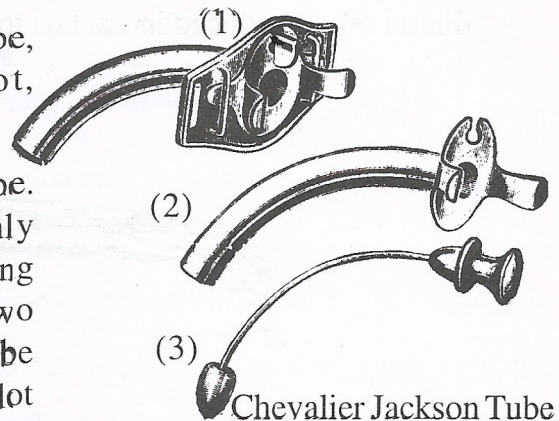


8. Tracheostomy Tube

Chevalier Jackson Metallic Tube

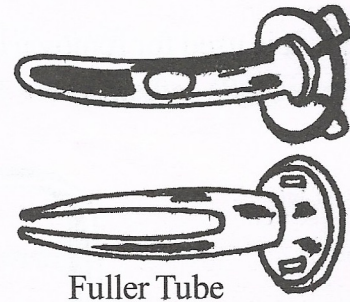
This tube has 5 parts - (1) outer tube, (2) inner tube, (3) pilot, (4) two flanges (shield), (5) lock.

The inner tube is longer than outer tube. When secretions block the tube only inner tube is removed without disturbing the outer tube. Ribbon is tied at the two flanges. Lock prevents the inner tube from coming out during coughing. Pilot helps for the introduction of the tube.



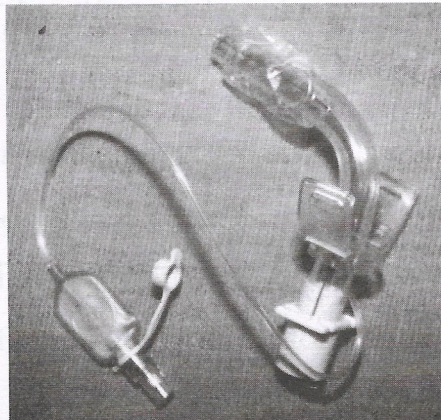
Fuller Metallic Tube

This tube has hole on the top of inner tube which helps the patient to breath through it and talk when the tube is closed and this way it helps in early decannulation. This tube has compressible flanges so easy to introduce without introducer.



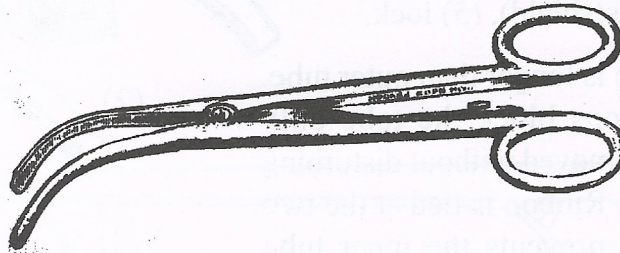
9. Cuffed / Noncuffed Tracheostomy Tube

It is made up of PVC material. The cuff is inflated to prevent aspiration in comatose patient and also for intermittent positive pressure respiration (IPPR). These tubes are useful in patients undergoing radiation therapy as metal tube may become radio-active by irradiation. The cuff should be deflated every 1 hour for 5 minutes to prevent pressure necrosis.

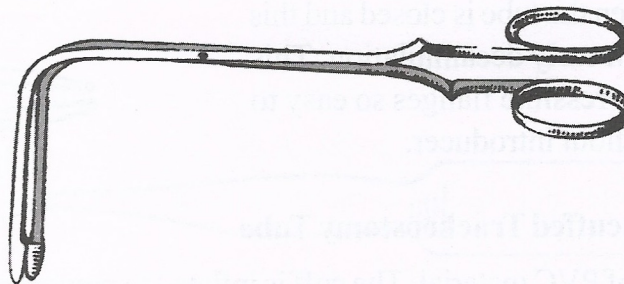


10. Trausseau's Tracheal Dilator

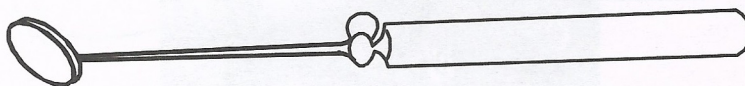
It is used in tracheostomy. After giving the incision on trachea, the blades of dilator are introduced in trachea to dilate the opening.

**11. Laryngeal Forcep**

It is used for removal of laryngopharyngeal foreign bodies.

**12. Laryngeal Mirror (for indirect laryngoscopy)**

Its handle is straight so should not be confused with posterior rhinoscopy mirror which has angulation. Structures seen and procedure is described in examination of larynx.



FREQUENTLY ASKED QUESTIONS (FAQs)

EAR

1. *How will you decide the amount of discharge ?*

Ans. There are 3 types of discharge :

Profuse Discharge - When discharge comes out of the ear.

Moderate Discharge - When discharge remains in the external auditory canal.

Scanty Discharge - When the tip of swab stick is stained by discharge.

2. *In which type of otitis media foul smelling discharge occurs ?*

Ans. Foul smelling discharge indicates unsafe type of otitis media, (Suspicion of cholesteatoma)

3. *What does it indicate, if ear discharge forms the string ?*

Ans. If discharge forms the string, it indicates the discharge from the middle ear as mucus secretory glands are present only in the middle ear and the discharge is not from the external ear.

4. *In which condition blood stained discharge occurs ?*

Ans. The blood stained discharge indicates presence of granulation tissue or any underlying malignancy.

5. *What is active and inactive stage of disease ?*

Ans. Active Stage – if discharge is present

Inactive Stage - if discharge is not present for minimum 3-6 weeks

Quiescent Stage - if discharge is absent for few days but reappears in between

6. *What indicates clear watery discharge from ear ?*

Ans. It indicates CSF otorrhoea.

7. *What is Paracusis Willisii ?*

Ans. When patient hears better in crowded place. It occurs in otosclerosis.

8. *What are the types of vertigo in Meniere's disease ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 7-8)

9. *What are the causes of Referred Otalgia ?*

Ans. Remember 5 T's for Referred Otalgia

Tongue, Teeth, Tonsil, Temporomandibular Joint, Throat (Pharynx, Larynx)

10. *What are types of Tinnitus ?*

Ans. Subjective and Objective Tinnitus (Details in the History & Examination of Ear chapter). (Page No. 9)

11. *What is autophony ?*

Ans. It is the excessive loudness of own voice. It occurs in acute suppurative and non-suppurative otitis media, patulous eustachian tube.

12. *What is ironing of mastoid ?*

Ans. In acute mastoiditis mastoid process is thickened due to periostitis.

13. *What is significance of post auricular sulcus ?*

Ans. It is obliterated in furunculosis but maintained in mastoid abscess.

14. *What is erection of pinna ?*

Ans. Pinna is pushed forward, outward and downward in mastoid abscess.

15. *What is difference between furunculosis oedema and acute otitis media with mastoiditis ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 12)

16. *How you classify Attic Retraction Pocket ?*

Ans. It can be classified into 4 grades :

Grade I : Pars flaccida not in contact with neck of malleus

Grade II : Pars flaccida in contact with neck of malleus

Grade III : Limited erosion of outer attic wall

Grade IV : Severe erosion of outer attic wall

17. *What is canal wall-down and canal wall- up procedures ?*

Ans. Canal Wall-Down Procedure : The posterior bony meatal wall and outer attic wall are removed. The attic, aditus, mastoid antrum and air cell are exteriorized to the external auditory meatus.

Canal Wall-Up Procedure : It is the tympanoplasty with mastoidectomy keeping posterior bony meatal wall intact. This procedure allows reconstruction of tympanic membrane with normal anatomical position.

18. *What is Cholesteatoma ?*

Ans. It is the presence of desquamated stratified squamous epithelium at an abnormal place.

19. *Whether Cholesteatoma is benign or malignant tumour ?*

Ans. It is benign tumour but locally malignant.

20. *What are types of Cholesteatoma ?*

Ans. It is of two types. Congenital and Acquired type. Acquired is again of two types : (1) Primary acquired cholesteatoma (2) Secondary acquired cholesteatoma.

21. *What is primary acquired and secondary acquired cholestatoma ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 30)

22. *What are the various theories of Cholesteatoma ?*

Ans. There are three theories :

1. Negative middle ear pressure theory
2. Invasion theory
3. Metaplasia theory

For the details of these theories, refer the History & Examination of Ear chapter. (Page No. 30-31)

23. *What are the complications of suppurative otitis media ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 31-32)

24. *What are the subperiosteal abscess ?*

- Ans.
1. Post aural abscess
 2. Zygomatic abscess
 3. Von Bezold's abscess
 4. Citelli's abscess
 5. Pharyngeal abscess

Refer the History & Examination of Ear chapter for details. (Page No. 32)

25. *What is middle ear cleft ?*

Ans. The middle ear cleft consists of tympanic cavity, aditus, mastoid antrum and the eustachian tube.

26. *What are the contents of middle ear ?*

Ans. The contents of middle ear are :

- Three ossicles -malleus, incus and stapes.
- Two muscles - tensor tympani (supplied by a twig from the mandibular division of trigeminal nerve) and stapedius muscle (supplied by the facial nerve).
- Two nerves - facial nerve with its bony wall i.e. fallopian canal and chorda tympani nerve.

27. *What is Tympanic Plexus ?*

Tympanic Plexus is formed by the ramification of the tympanic nerve (Jacobson's nerve) which is a branch of the glossopharyngeal nerve.

28. *What are the different types of mastoidectomy ?*

Ans. These are 3 types of mastoidectomy :

1. Cortical Mastoidectomy
2. Radical Mastoidectomy
3. Modified Radical Mastoidectomy

Refer the Operations chapter. (Page No. 112-114).

29. *What is Griesinger's sign ?*

Ans. It is the oedema at post-auricular region. It is due to thrombosis of the mastoid emissary vein.

30. *What signifies the tenderness at the mastoid process and at the cymba conchae ?*

Ans. It signifies mastoiditis.

31. *What is three finger test and the surgical importance of cymba conchae?*

Ans. For three finger test, refer History and Examination of Ear chapter (Page No.12)
Surgical importance of cymba conchae - The suprameatal triangle lies under it and mastoid antrum lies about 1.25 cm. deep to the triangle.

32. *What are the boundaries of suprameatal triangle (Macewen's triangle) ?*

Ans. This triangle is formed superiorly by the supra-mastoid crest, anteriorly by the posterior external auditory canal and posteriorly by the vertical tangent drawn at posterior wall of external auditory canal.

33. *What is tragal sign ?*

Ans. Tenderness of tragus is called tragal sign. It occurs in furunculosis.

34. *How you examine external auditory canal ?*

Ans. The external auditory canal is examined by pulling the pinna upward, outward and backward in adults and downward and backward in children (as bony canal is not developed).

35. *What is Wax ?*

Ans. Wax is the accumulated secretion from ceruminous glands. It is removed by aural syringing after softened by glycerine-sodium bicarbonate drops.

36. *What is the colour of tympanic membrane ?*

Ans. It is pearly grey in colour.

37. *What are the tuning fork test ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 20-22)

38. *What are the series of tuning fork test ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 22)

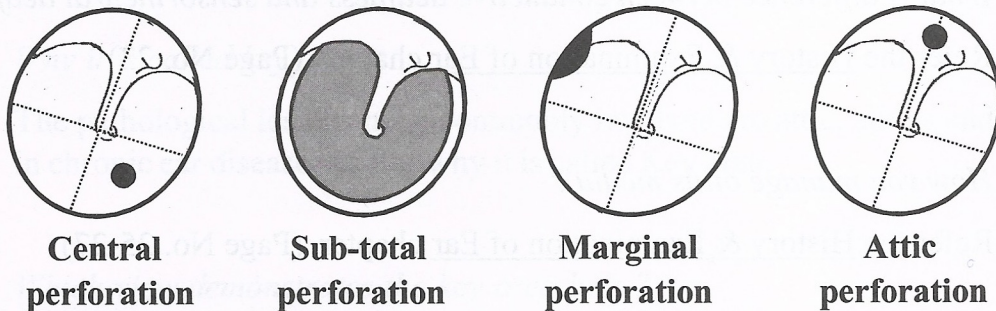
39. *What is conversation test ?*

Ans. Refer the History & Examination of Ear chapter. (Page No.23)

40. *What are the different types of perforation in tympanic membrane ?*

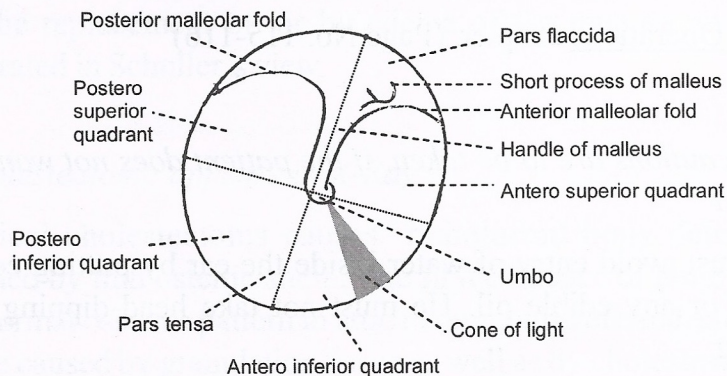
- Ans. 1. **Central Perforation** : When perforation is surrounded all around by the tympanic membrane. It occurs in pars tensa and found in tubotympanic type of otitis media. *Subtotal perforation* - It is the large central perforation and annulus is present only as a rim. *Total perforation* - When annulus is not present and destroyed all around.
2. **Marginal Perforation** : It is not surrounded all around by the tympanic membrane. It is usually associated with secondary acquired cholesteatoma.
3. **Attic Perforation** : It is situated in attic. It indicates primary acquired cholesteatoma.

Marginal and attic perforation is found in atticoantral type of otitis media.



41. *What are the different quadrants of tympanic membrane ?*

Ans. The pars tensa is divided into 4 quadrants by drawing an imaginary line extending downwards from the handle of malleus and one more imaginary line at right angle to the first line at the umbo thus dividing the tympanic membrane into four quadrants- antero superior, antero inferior, postero inferior and postero superior.



42. *What are the different tests to know the mobility of tympanic membrane ?*

Ans. Valsalva's method and by the Siegle's pneumatic speculum

43. *What are the different tests to know the patency of Eustachian tube ?*

Ans. Valsalva's method or autoinflation, Toynbee's test, Politzer method, eustachian tube catheterization.

Refer the History & Examination of Ear chapter. (Page No. 18-19)

44. *What is fistula test ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 19)

45. *What is difference between conductive deafness and sensorineural deafness ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 23)

46. *How you manage otitis media ?*

Ans. Refer the History & Examination of Ear chapter. (Page No. 25-27)

47. *What is tympanoplasty ?*

Ans. Refer the Operations chapter. (Page No. 115-117)

48. *What are the different types of tympanoplasty ?*

Ans. Refer the Operations chapter. (Page No. 115-116)

49. *What precautions are to be taken, if the patient does not want tympanoplasty presently ?*

Ans. Patient must avoid entry of water inside the ear by putting cotton moist with glycerine or any edible oil. He must not take head-dipping bath and avoid swimming.

50. *What are the different radiological views for temporal bone.*

Ans. The common five views are :

1. Laws Position - X ray beam is directed downward from 15 degree elevation
2. Schuller Position- Beam is directed to 30 degree
3. Mayer Position- Beam is directed to 45 degree
4. Owen Position
5. Stenvers Position

51. *What is key area ?*

Ans. The key area is (i) Attic (ii) Aditus (iii) Antrum

52. *Why it is called key area ?*

Ans. The pathological lesions most commonly involved are attic, aditus and antrum in chronic ear disease. That is why it is called Key area.

53. *Which view demonstrates the key area best ?*

Ans. Schuller's view demonstrate the key area best.

54. *How acute mastoiditis looks in X-Ray ?*

Ans. Acute mastoiditis occurs in cellular mastoid and the earliest finding in X ray is the clouding i.e. increased opacity of the mastoid air cell. The clouding occurs due to the replacement of air by edema of the mucosa and fluid. It is best demonstrated in Schuller's view.

55. *How cholesteatoma appears in X-Ray ?*

Ans. The typical cholesteatoma causes radiolucent bony defect in antral area surrounded by thin osteitic shell. The first evidence of bone destruction is the loss of normal osseous pattern in attic (commonly referred as osteolytic lesion). It may be caused by granulation tissue as well as by cholesteatoma.

NOSE AND SINUSES

1. *What is the cause of unilateral foul smelling discharge from nose in children ?*

Ans. It is highly suggestive of foreign body in nose.

2. *What is the type of discharge in C.S.F. Rhinorrhoea ?*

Ans. It is clear fluid like discharge.

3. *What is Honeymoon Rhinitis ?*

Ans. It is vasomotor rhinitis.

4. *What is Anterior Ethmoidal Neuralgia ?*

Ans. It is high DNS pressing middle turbinate causing pressure on anterior ethmoidal nerve. It is also known as Sluder's neuralgia

5. *What is Allergic Salute ?*

Ans. It is the lifting of the tip of nose upwards with the palm due to repeated itching of the nose.

6. *What is anosmia, parosmia, cacosmia hyposmia and hyperosmia ?*

Ans. Anosmia - It is loss of smell occurs commonly in atrophic rhinitis.

Parosmia - It is perverted smell, occurs in skull fracture and after streptomycin injection.

Cacosmia- It is feeling of bad smell due to intrinsic causes.

Hyposmia - It is decreased sensibility of smell occurring in old age, menopause, tobacco smoker and radiation therapy of nose.

Hyperosmia - It is increased sensibility of smell occurring in neurotic person, epilepsy, pregnancy and cystic fibrosis.

7. *What is the most common site of bleeding from nose in adult and in children ?*

Ans. Little's area is the commonest site of bleeding in adult and retrocolumnar vein is the commonest site of bleeding in children.

8. *What is the commonest cause of bleeding from nose in adult and in children ?*

Ans. Hypertension is the commonest cause of epistaxis in adult and acute rhinitis is the commonest cause of epistaxis in children.

9. *Where is Little's area situated ?*

Ans. Little's area is situated at anteroinferior part of septum.

10. *What is the name of vascular plexus at Little's area ?*

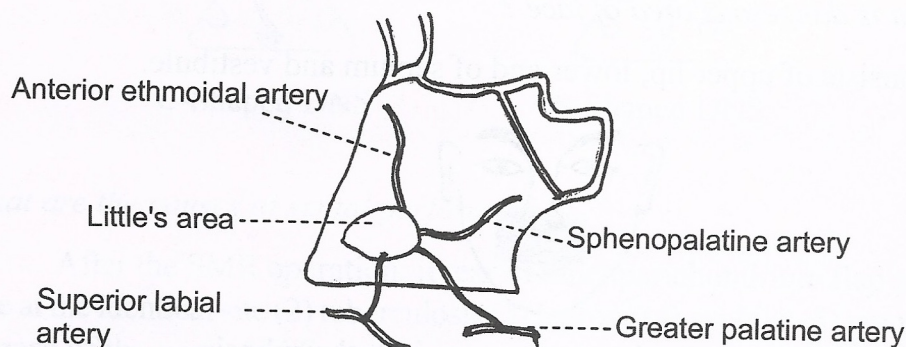
Ans. The vascular plexus at little's area is known as Kiesselbach's plexus.

11. *What are the causes of epistaxis ?*

Ans. Refer the History & Examination of Nose & Paranasal Sinuses. (Page No. 38)

12. *Name the four artery anastomosis at Little's area.*

- Ans.
1. Septal branch of sphenopalatine artery
 2. Anterior ethmoidal artery
 3. Terminal branch of greater palatine artery
 4. Septal branch of superior labial artery



13. *What is the artery of epistaxis ?*

Ans. Septal branch of sphenopalatine artery is known as artery of epistaxis as it carries maximum blood to nose.

14. *What is area of Woodruff ?*

Ans. It is the venous plexus situated near the posterior end of inferior turbinate.

15. *What is Epistaxis Digitorium ?*

Ans. It is bleeding from nose due to nose picking.

16. *Who described the Little's area ?*

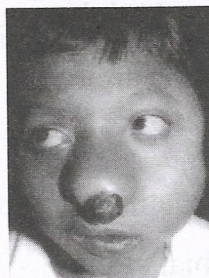
Ans. It was described by James little.

17. *What is Potato Nose ?*

Ans. Rhinophyma is also known as potato nose. It is the benign condition in which there is hypertrophy of sebaceous glands.

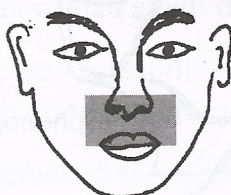
18. *In which condition Frog Face Deformaty is seen ?*

Ans. It is seen in Juvenile nasopharyngeal angiofibroma.



19. *What is dangerous area of face ?*

Ans. It consists of upper lip, lower end of septum and vestibule.



The infection may lead to cavernous sinus thrombosis.

20. *What is danger area of nose ?*

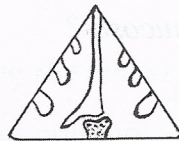
Ans. It is the olfactory area of nose.

21. *What is atrophic rhinitis ?*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 45)

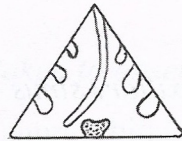
22. *What is Septal Spur ?*

Ans. It is the sharp angulation occurring at the junction of septal cartilage with the ethmoid or vomer bone.



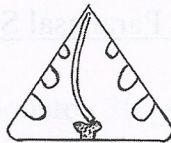
23. *What is septal dislocation ?*

Ans. It is the dislocation of septum from the median position.

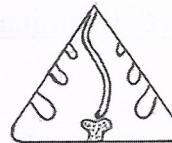


24. *What are the types of septal deviation ?*

Ans. These are C shaped or S shaped deviation.



C-Shaped DNS



S-Shaped DNS

25. *What are the causes of septal perforation ?*

Ans. (i) After the SMR operation, if tear of mucoparichondrium flap on both the side at the identical site (2) tuberculosis (3) leprosy (4) syphilis (5) granulomatous disease of the nose (6) idiopathic.

26. *Difference between septoplasty and SMR operation.*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 44)

27. *What is FESS ?*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 48)

28. *What is difference between ethmoid and antrochoanal polyp ?*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 47)

29. *What are the causes of pale mucosa ?*

Ans. Anaemia, allergy, tuberculosis.

30. *What is Juvenile nasopharyngeal angiofibroma ?*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 50)

31. *What is the other name of maxillary sinus ?*

Ans. It also known as antrum of Highmore.

32. *What is Ohngren's classification ?*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 52)

33. *What is Lederman's classification ?*

Ans. Refer to History & Examination of Nose & Paranasal Sinuses. (Page No. 53)

34. *What is the meaning of Ethmoid ?*

Ans. Ethmoid means sieve like structure.

35. *Roomy nasal cavity is seen in which condition ?*

Ans. It is seen in atrophic rhinitis.

36. *What are the sites of headache in sinusitis ?*

Ans. • Maxillary Sinus causes Infraorbital Pain
• Frontal Sinus causes Supraorbital Pain
• Ethmoid Sinus causes pain over the bridge of nose and between the eyes.
• Sphenoid Sinus causes occipital, vertical or retroorbital pain.

37. *What are the sites of eliciting the tenderness for different sinuses ?*

Ans. • Maxillary sinus – firm pressure at canine fossa
• Frontal sinus – at the floor of frontal sinus
• Ethmoid sinus- at the lateral side of bridge of nose

38. *What precaution has to be taken to observe the tenderness of frontal sinus ?*

Ans. One should not press the supraorbital nerve otherwise it may cause false tenderness.

39. *What is alkaline nasal douching solution ?*

Ans. It consists of :

Sodium Bicarbonate - 30 gm.

Sodium Biborate - 30 gm.

Sodium Chloride - 60 gm.

40. *What is the common name of these salts ?*

Ans. Sodium bicarbonate is known as edible soda, sodium biborate is known as suhaga and sodium chloride is known as edible salt.

41. *What precaution patient of atrophic rhinitis and patient of maggot nose should take while sleeping ?*

Ans. They should use mosquito net in the night while sleeping to prevent the further laying of egg by the fly.

42. *What is the biggest problem of patient of atrophic rhinitis ?*

Ans. Biggest problem is the social boycott because of bad smell.

43. *What is the main complication of maggot inside the nose ?*

Ans. It may cause meningitis.

44. *What is the other name of atrophic rhinitis ?*

Ans. It is also known as ozaena.

45. *What is Ringertz's tumour ?*

Ans. It is inverted papilloma of nose and sinuses. It is called inverted as there is inward growth of epithelium towards stoma.

46. *What signifies the pus in nasal cavity ?*

Ans. Pus in the middle meatus suggests suppuration of anterior group of sinuses. Pus in the olfactory cleft suggests suppuration of posterior group of sinuses.

47. *What are the anterior and posterior groups of sinuses ?*

Ans. The anterior groups of sinuses are frontal sinus, anterior ethmoid group of sinuses and maxillary sinus, open in middle meatus anterior to posterior in that order

The posterior groups of sinuses are posterior ethmoid cell open into superior meatus and Sphenoid sinus open into sphenoethmoid recess.

48. *Name the tumours of ENT that spread by expansion rather than invasion.*

The tumours of ENT that spread by expansion rather than invasion are Cholesteatoma, Juvenile nasopharyngeal angiofibroma, inverted papilloma and glomus jugulare.

49. *What instruction you should give to patient while doing indirect laryngoscopy?*

Ans. For indirect laryngoscopy, ask patient to breath through mouth.

50. *What are the structures seen in posterior rhinoscopy ?*

Ans. Refer the History & Examination of Nose & Paranasal Sinuses. (Page 49-50)

51. *What instruction should be given to the patient for the posterior rhinoscopy ?*

Ans. Patient should breath through the nose so that soft palate comes forward.

52. *What are the different radiological views for the paranasal sinuses ?*

Ans. A. Occipitomental view or Water's View for the maxillary sinus.

B. Occipitofrontal view for frontal sinus.

53. *How sinusitis looks in the X-Ray ?*

Ans. The sinusitis produces haziness of sinuses (It should be compared with orbit for the haziness).

54. *How malignancy of the sinus looks in the X-Ray ?*

Ans. It causes erosion of the wall of sinus.

55. *What is Burkitt lymphoma ?*

Ans. It is the jaw tumour commonly seen in the Africans.



TONSIL

1. *In which position Tonsillectomy is done ?*

Ans. It is done in Rose's position.

2. *What is Rose's position ?*

Ans. It is the position in which patient lies supine with sand bag under the shoulder and mouth is opened with mouth gag. The surgeon sitting on stool doing surgery. The tonsillectomy under general anaesthesia is done in this position.

3. *What is the advantage of Rose's position ?*

Ans. This position allows the blood to collect in nasopharynx and not in the throat.

4. *What is Tonsillar position ?*

Ans. It is left lateral position after the tonsillectomy in the postoperative period.

5. *What are the types of tonsillitis ?*

Ans. Tonsillitis can be acute or chronic.

Acute tonsillitis can be :

- (1) Acute follicular type
- (2) Acute parenchymatous type
- (3) Acute membranous type

Chronic Tonsillitis can be :

- (1) Chronic follicular type
- (2) Chronic parenchymatous type
- (3) Chronic fibroid type

6. *What is Waldeyer's ring ?*

Ans. Refer the Examination of Neck chapter. (Page No. 87)

7. *What are the indications and contraindications of tonsillectomy ?*

Ans. Refer to the Operations chapter. (Page No. 107-108)

8. *What will happen if we press the posterior part of tongue while examining the tonsil?*

Ans. It will cause gag reflex.

9. *What are the complications of acute tonsillitis ?*

Ans. The complications of acute tonsillitis are :

- (1) Chronic tonsillitis
- (2) Quinsy
- (3) Parapharyngeal abscess
- (4) Suppurative cervical adenitis
- (5) Acute otitis media
- (6) Systemic complications are - rheumatic fever, acute glomerulonephritis, chorea, subacute bacterial endocarditis.

10. *What are the complications of Chronic tonsillitis ?*

Ans. The complications of chronic tonsillitis are :

- (1) Quinsy
- (2) Parapharyngeal abscess
- (3) Intra-tonsillar abscess
- (4) Tonsillolith
- (5) Tonsil cyst

11. *What are the cardinal signs of chronic tonsillitis ?*

Ans. The cardinal signs of chronic tonsillitis are :

- (1) Flushing of anterior pillar
- (2) On pressing the anterior pillar, cheesy material comes out of tonsil
- (3) Enlarged tender jugulodigastric lymph node, when there is no other reason for it.

Out of these 3 sign, if 2 are present it is suggestive of chronic tonsillitis.

12. *What is one absolute contraindication of tonsillectomy ?*

Ans. Epidemic of poliomyelitis is the only absolute contraindication of tonsillectomy as polio virus may enter through exposed nerve endings.

13. *What are the other contraindications of tonsillectomy ?*

Ans. The other relative contraindications are hypertension, blood dyscrasias (i.e. hemophilia and leukemia) and acute infection of tonsil.

14. *Why Tonsillectomy is to be avoided during acute tonsillitis ?*

Ans. Tonsillectomy is avoided during acute tonsillitis (hot tonsillectomy) as bleeding is more during acute infective state.

15. *What is Tonsillolith ?*

Ans. It is the deposition of calcium and magnesium carbonates and phosphates in the tonsil crypts.

16. *What is intra-tonsillar abscess ?*

Ans. There is communication between the enlarged crypts causing collection of pus.

17. *What is Tonsil Cyst ?*

Ans. Debris accumulating in the tonsil crypts may be sealed off by fibrous occlusion of surface opening forming the tonsil cyst.

18. *What was the cause of death of first US President George Washington in his death certificate ?*

Ans. The cause of death of first US President George Washington was written as Quinsy in his death certificate but controversy surrounds it as he died probably because of acute epiglottitis or croup syndrome and not of quinsy.

19. *What is Quinsy ?*

Ans. It is abscess formation into the peritonsillar space. It is the Greek word meaning dog rattle.

20. *What is treatment of Quinsy ?*

Ans. The treatment is incision & drainage. The site of incision is :

1. The most prominent part. If it is not identified then-
2. Half way between the base of uvula and upper third molar tooth.
3. Vertical line drawn upward from the anterior pillar and horizontal line drawn lateral to uvula, the point where two imaginary lines meet, incision is given outside of it.

21. *What is abscess tonsillectomy ?*

Ans. It is the tonsillectomy done in Quinsy, but not practised as bleeding is more during acute infective stage.

22. *What is the other name of Paratonsillar vein ?*

Ans. It is also known as Dennis Browne vein.

23. *What are the different methods of tonsillectomy ?*

- Ans. 1. Dissection Method
 2. Guillotine Method
 3. Cryosurgery
 4. Laser Surgery
 5. Harmonic scalpel
 6. Coablation (bipolar) & Radio frequency (monopolar)

24. *When normal tonsils are removed ?*

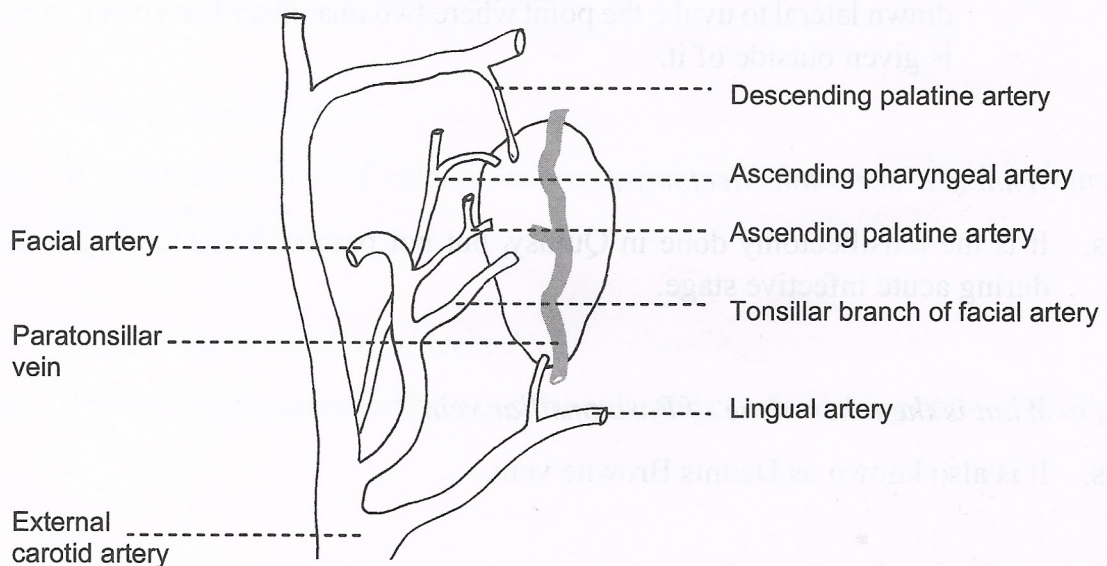
Ans. The normal tonsils are removed for :

1. As an approach for the glossopharyngeal neurectomy.
2. As an approach for the enlarged styloid process causing styalgia.

25. *What is arterial supply of tonsil ?*

Ans. Tonsil is supplied by :

1. Tonsillar branch of facial artery (main arterial supply of tonsil)
2. Ascending palatine artery
3. Branch of ascending pharyngeal artery
4. Branch of dorsal lingual artery
5. Descending palatine artery



26. *What are the types of haemorrhage in tonsillectomy ?*

- Ans. 1. Primary haemorrhage, which occurs during the surgery.
2. Reactionary haemorrhage, which occurs 4-6 hours after the surgery. It occurs due to slippage of ligature due to the rise of blood pressure after the effect of anaesthesia wears off and due to postoperative reactionary oedema. The treatment is securing the bleeding vessels under general anaesthesia. If bleeding is not controlled by this, suturing of anterior and posterior pillars is undertaken.
3. Secondary haemorrhage - occurs 5-10 days after the surgery. It is due to infection and needs change of antibiotics, sedation and rest.

27. *In which condition the throaty cry resembling quack of duck is found ?*

Ans. It is found in acute retropharyngeal abscess

28. *What is difference between swelling of acute and chronic retropharyngeal abscess ?*

Ans. The acute retropharyngeal abscess causes swelling on one side of posterior pharyngeal wall in front of prevertebral fascia in the space of Gillette.

The chronic retropharyngeal abscess causes smooth swelling on posterior pharyngeal wall behind the prevertebral fascia (as it is because of caries of cervical spine).

29. *What is adenoid facies ?*

Ans. It is pinched nose, open mouth, high arch palate and crowded and protruding teeth. It occurs in chronic enlargement of adenoids.

30. *What is difference between Adenoid and Tonsil ?*

Ans. Refer the Examination of Tonsil chapter. (Page No. 67)

31. *What is sleep apnoea ?*

Ans. Refer the Examination of Tonsil chapter. (Page No. 67)

32. *What are the pre-cancerous condition of tongue ?*

Ans. Refer the Examination of Oral Cavity chapter. (Page No. 57)

33. *What is Rhinolalia Aperta and Clausa ?*

Ans. Refer the Examination of Oral Cavity chapter. (Page No. 58)

34. *What is trotter triad ?*

Ans. Refer the Examination of Oral Cavity chapter. (Page No. 58)

35. *What is graveyard of oral cavity ?*

Ans. The tonsillo-lingual sulcus as it is important site for the primary malignant growth and often overlooked.

36. *What precaution you should take while palpating the tongue ?*

Ans. It should be inside the oral cavity as protruded tongue causes contraction of muscle and may give rise to false induration.

37. *What is Leukoplakia and Erythroplakia ?*

Ans. Refer the Examination of Oral Cavity chapter. (Page No. 59)

38. *What is complaint of patient in soft palate paralysis ?*

Ans. Regurgitation of water from nose and hypernasal voice.

39. *In which salivary gland, the stone formation is common ?*

Ans. Refer to Examination of Salivary Gland chapter. (Page No. 63)

LARYNX

1. *What is Adam's apple ?*

Ans. It is two alae of thyroid cartilage which meet in mid line . It is about 90° in men and about 120° in women.

2. *What is Laryngeal Crepitus ?*

Ans. It is the normal sound produced by the movement of laryngeal cartilage against the cervical spine.

3. *What is the significance of Laryngeal Crepitus ?*

Ans. Absence of this sound (Boaca's sign) may be due to the possibility of growth between the laryngeal framework and the cervical spine (postcricoid carcinoma).

4. *What is Jackson's sign.*

Ans. It is the pooling of saliva in both pyriform fossa. It is highly suspicious of postcricoid malignancy.

5. *What is singer's nodule ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 70)

6. *What is difference between solitary papilloma and juvenile papilloma ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 70)

7. *What are the different positions of vocal cords ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 71-72)

8. *What is difference between Direct Laryngoscopy and Indirect Laryngoscopy ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 73)

9. *What is other name of vocal nodule ?*

Ans. It is also known as singer's nodule.

10. *What is the site of vocal nodule ?*

Ans. It occurs at the junction of anterior 1/3 and posterior 2/3 of the vocal cords.

11. *What is Semon's law and what is its exception ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 74)

12. *What is difference between Paralysed Cord and Fixed Cord ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 76)

13. *Why the course of left recurrent laryngeal nerve is different than right recurrent laryngeal nerve ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 77-78)

14. *What are the Laryngeal Spaces ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 78-79)

15. *What is TNM Classification of Carcinoma of Larynx ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 81)

16. *What is Broder's classification ?*

Ans. Refer to the Examination of Larynx chapter. (Page No. 82)

17. *Which carcinoma of Larynx is most preferred if you are given the choice ?*

Ans. Glottic cancer as hoarseness of voice is the first and most early symptom for which patient seeks early medical advice hence diagnosed early. Glottis has no lymphatics and act as watershed so there is no lymphatic metastasis.

CRANIAL NERVES

1. *Which cranial nerve is longest cranial nerve ?*

Ans. Vagus nerve (10th cranial) is the longest cranial nerve.

2. *Which cranial nerve has longest intra cranial course ?*

Ans. Abducent nerve (6th cranial nerve) has longest intra cranial course.

3. *Which cranial nerve is most slender cranial nerve ?*

Ans. Trochlear nerve (4th cranial nerve) is the most slender cranial nerve.

4. *Which cranial nerve has longest course in the bony canal ?*

Ans. Facial nerve (7th cranial nerve) has longest course in the bony canal.

5. *Which cranial nerve is most frequently paralyzed nerve ?*

Ans. Facial nerve (7th cranial nerve) is most frequently paralyzed than any other motor nerve in the body.

6. *What is the cause if facial paralysis occurs immediately after the trauma or few hours or days after the trauma ?*

Ans. The facial paralysis occurring :

- immediately after the trauma - due to bisection of nerve due to fracture.
- few hours or days after the trauma - due to fracture of facial canal and post-traumatic edema of the nerve.

7. *What is the commonest cause of facial nerve paralysis ?*

Ans. Bell's Palsy is the commonest cause of facial nerve paralysis (70%), followed by surgical injury to the nerve within the temporal bone (15%), otitis media (8%) cases.

8. *What is the length of horizontal portion and vertical portion of facial nerve ?*

Ans. The horizontal portion of the facial nerve measures 10 to 12 mm in length and vertical portion measures about 13 mm in length.

9. *Facial nerve is which type of nerve ?*

Ans. Facial nerve is mixed nerve carrying motor fibres, sensory fibres, secretomotor and taste fibres.

10. *Who was Bell ?*

Ans. Bell was anatomist and surgeon. Bell described the distinction between the sensory innervation of the face by the 5th cranial nerve and the motor innervation of the muscle of expression by 7th cranial nerve at the stylomastoid foramen. He was knighted for his neurophysiological discoveries.

11. *How Bell's palsy nomenclature came ?*

Ans. At first Bell's name was applied to all cases of flaccid paralysis of facial nerve but later on specific diseases affecting the facial nerve were separated, Bell's palsy is applied to only idiopathic paralysis.

12. *What is the peculiarity of neurons of facial nerve supplying lower part and upper part of face ?*

Ans. The neurons of facial nerve innervating the lower part of face are entirely crossed while to the upper part of face are both crossed and uncrossed.

THYROPLASTY

A surgical technique designed to improve the voice by altering the cartilages of the larynx, in order to change the position or length of the vocal folds.

Thyroplasty is also known as laryngeal framework surgery, was first described by Isshiki and his team in 1975.

Type-I: Medialisation (Indication : unilateral vocal cord paralysis / paralytic dysphonia)

Type-II: Lateralisation (Indication : Spastic dysphonia)

Type-III: Shortening (Indication : Puberty dysphonia)

Type-IV: Lengthening (Indication : Androphonia in females)

Case Presentation in ENT

Ear Case

1. Name
2. Age
3. Sex
4. Caste
5. Religion
6. Occupation
7. Address
8. Past History
9. Personal History
10. Family History
11. Social History
12. General Examination-esp. Lymph Nodes
13. Complaints
14. History of Presenting Illness
 - (i) Discharge
 - (ii) Deafness
 - (iii) Vertigo
 - (iv) Pain
 - (v) Tinnitus
 - (vi) Autophony
 - (vii) Facial Nerve Palsy
 - (viii) Fever
 - (ix) Headache
15. Examination of Ear
 - (1) Pinna
 - (2) Pre Auricular Region
 - (3) Post Auricular Region
 - (4) Post Auricular Sulcus
 - (5) Protrusion of Pinna
 - (6) Tenderness of Mastoid
 - (7) External Auditory Canal
 - (8) Tympanic Membrane
 - (a) Colour- normal Pearly grey colour/Pale
 - (b) Perforation-type-Central/Marginal/Attic
 - (c) Number of Perforation-Single/Multiple
 - (d) Margin of Perforation-Smooth/Ragged
 - (e) Shape of Perforation-Round/Oval/Kidney shaped

- (9) Middle Ear Mucosa-Normal pink velvety mucosa/Pale
- (10) Coralisation through perforation
- (11) Handle of Malleus-Foreshortened/Normal
- (12) Cone of Light-Absent/Present
- (13) Quadrants of Tympanic Membrane- any pathology?
- (14) Granulation or Polyp -Absent/Present
- (15) Retraction Pocket-Absent/Present
- (16) Incudostapedial Joint-Seen/Not Seen
- (17) Congestion
- (18) Mobility of Tympanic Membrane
- (19) Fistula Test
- (20) Facial Nerve Examination
- (21) Tuning Fork Test-Rinne's Test/Weber's Test/Absolute Bone Conduction test
- (22) Audiometry

16. Provisional Diagnosis-Chronic Suppurative Otitis Media -

Tubotympanic type (safe type) or
Atticoantral type (unsafe type)

17. Investigations-(i) Routine blood & urine investigations

(ii) X ray Mastoid Schuller's view-both sides

18. (A) Management of Tubotympanic type of Otitis Media (safe type)

- (i) Aural toilet
- (ii) Ear swab for culture sensitivity
- (iii) Broad spectrum antibiotic
- (iv) Local antibiotic ear drop
- (v) Systemic antihistamines and decongestant
- (vi) Local decongestant nasal drop
- (vii) Protection of ear from water
- (viii) Treatment of septic foci- Tonsils/Adenoid/DNS/Sinus
- (ix) Tympanoplasty

18. (B) Management of Atticoantral type of Otitis Media (Unsafe type)

- (i) Aural toilet
- (ii) Ear swab for culture sensitivity
- (iii) Broad spectrum antibiotic
- (iv) Granulation/Polyp removal (if any)
- (v) Surgery-Modified radical mastoidectomy

Nose Case

1. Name
2. Age
3. Sex
4. Caste
5. Religion
6. Occupation
7. Address
8. Past History
9. Personal History
10. Family History
11. Social History
12. General Examination -esp. Lymph Nodes
13. Complaints
14. History of Presenting Illness
 - (i) Nasal Discharge
 - (i) Unilateral/Bilateral
 - (ii) Character of discharge-Watery/Mucoid/Purulent
 - (iii) Blood stained discharge
 - (ii) Nasal Obstruction- Unilateral/Bilateral
 - (iii) Crust-Present/Absent
 - (iv) Headache
 - (v) Sneezing
 - (vi) Itching of nose
 - (vii) Smell
 - (viii) Snoring
 - (ix) Epistaxis
15. Examination of Nose
 - (i) External Examination of Nose
 - (ii) Cold Spatula Test
 - (iii) Anterior Rhinoscopy
 - (i) Nasal septum
 - (ii) Nasal cavity
 - (iii) Turbinates
 - (iv) Middle meatus
 - (v) Mucosa
 - (vi) Discharge
 - (vii) Crusts
 - (viii) Polyp
 - (ix) Mass
 - (x) Bleeding
 - (xi) Pus

- (iv) Posterior Rhinoscopy
- (v) Sinus Examination-Maxillary Sinus/Ethmoid Sinuses/Frontal Sinus
- (Vi) Nasal Endoscopy
- 16. Provisional Diagnosis-Deviated Nasal Septum-Left/Right or Polyp or Sinusitis
- 17. Investigations- (i) Routine blood & urine investigations
 - (ii) X ray Paranasal Sinuses
 - Water's view (Occipitomenal view) for Maxillary Sinus
 - Caldwell's View (Occipitofrontal view) for Frontal Sinus
 - (iii) CT Scan Paranasal sinuses
- 18. Treatment
 - (i) DNS- Septoplasty
 - (ii) Polyp-Polypectomy & FESS (Functional Endoscopy Sinus Surgery)
 - (iii) Sinusitis-FESS (Functional Endoscopy Sinus Surgery)

Throat Case

1. Name
2. Age
3. Sex
4. Caste
5. Religion+9
6. Occupation
7. Address
8. Past History
9. Personal History
10. Family History
11. Social History
12. General Examination -esp. jugulo-digastric lymph nodes enlarged
13. Complaints
14. Examination of Oral Cavity and Tongue
15. Examination of Tonsil
 - (i) Enlarged
 - (ii) Congested
 - (iii) White cheesy materials over the tonsil
 - (iv) Flushing of anterior pillars
16. Examination of Posterior Pharyngeal Wall
17. Provisional Diagnosis- Chronic Tonsillitis
18. Investigation - (i) Routine blood & urine investigations
 - (ii) Blood coagulation tests (BT, CT, PT, APTT etc.)
19. Treatment- Tonsillectomy

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